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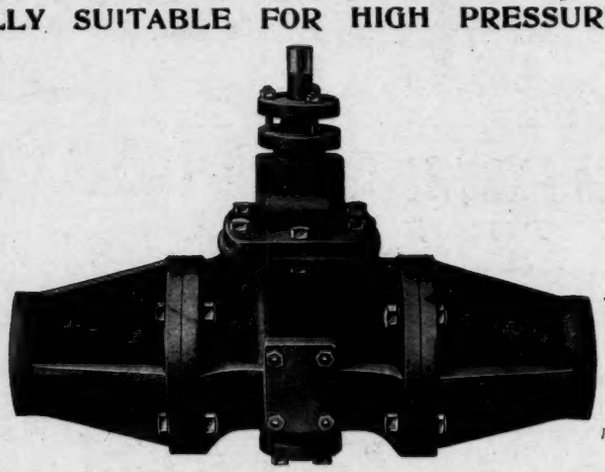

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EDITORIAL NOTES.

Commercial Company's Coal Contracts.

IT was an excellent account, under the circumstances of the times, that the Chairman of the Commercial Gas Company (Mr. W. G. Bradshaw) had to lay before the proprietors last Thursday. But the feature of general interest will be the statement made regarding the Company's new coal and oil contracts—a statement which considerably modifies the rosy one as to coal that, obviously through misunderstanding, was made six months ago. The Chairman then said that the Directors had actually "contracted for a substan- "tial quantity [of coal] at a price considerably less than "the limit fixed by the Price of Coal (Limitation) Act, "1915." That was in February; and we were, in view of the approaching contract season, delighted with the intelligence, and particularly with the expressions "substantial "quantity" and "considerably less." But the news caused a little consternation in various quarters in which contracts had already been made, or negotiations were pending, at prices which, instead of showing themselves "considerably "less," were in some cases uncomfortably higher than the limit set by the Act, through the manœuvres of colliery-owners' to gain larger profits than were ordained. There seemed no reason whatever why the Commercial Company should have received preferential treatment. Now the modified statement indicates that the Company in respect of their coal contracts were in much the same boat as other gas undertakings. "At our meeting in February," said Mr. Bradshaw last Thursday, "I mentioned that "we had contracted to buy some coals at a price which "was not unsatisfactory." This finally disposes of the doubts to which the February statement gave rise; and what follows accentuates the fact that the Company have experienced, taking the aggregate of their contracts, much the same treatment as other gas undertakings. "Unex- "pected difficulties arose," observed the Chairman; and "it is only in the last few weeks that we have completed "contracts for our necessary supplies for the current twelve "months. I need not tell you that we have had to pay *very* "*much higher prices* than last year." Later on, too, he remarked that the cost of coal is now just double "what it was "a few years ago, while oil is costing three times as much." We take it that the February statement was based upon a misinterpretation of the Price of Coal (Limitation) Act, inasmuch as the Chairman now declares that the Act is so difficult to interpret that nobody seems to know what is its true meaning, and so coalowners have been enabled to charge almost what they like. However, the Company's increase in the price of gas is one of the lowest in the Metropolitan area; and this is due to two things—the protection of the consumers against heavy and vacillating rates of freight; and the excellence of the working at the Company's stations, for which due praise was accorded by the Chairman to Mr. Stanley H. Jones and his staff and men.

Coal Output and Exports.

IT is impossible, as fresh evidence accrues, to refrain from pointing out that, in relation to coal deliveries and to the other troubles from which consumers are suffering, the shortage of coal output has no real existence if reductions in exports are taken into account. It was at one time anticipated that the decline of output through the withdrawal of miners for active service (notwithstanding the transfer to the collieries of labour from other industries) would be about 36 million tons a year, and that the lowering of exports would only amount to 24 million tons—leaving a shortage of production of about 12 million tons. But it will be remembered that Sir Richard A. S. Redmayne, K.C.B., Chief Inspector of Mines, and Chairman of the Departmental Committee who have in hand the question of organization in the coal industry, stated some time ago that the loss of output in the first year of the war was not so great as was anticipated would be the case. As a matter of fact, the falling-off (according to his report) was about 30 million tons; and the monthly rate of decrease lessened compared with the earlier months of the war, owing to the efforts made to reduce absenteeism. There has fortunately been considerable success in this direction. Taking the calendar years, and not the war years, the official figures show a different state of affairs. There was a reduction in the output of coal in 1915, compared with 1913 (which was an extraordinary one for output), of 34,224,000 tons; while in 1915, as compared with 1914, the decrease of output was only 12,455,000 tons. This is extraordinary, seeing that the year 1914 contained seven months of peace and only five months of war; while 1915 was wholly under war conditions. And, in the report already referred to, Sir Richard Redmayne stated that the average monthly rate of decrease was upwards of 3 million tons for the first seven months of war, while for the succeeding five months it was something less than $1\frac{3}{4}$ million tons.

From the various figures it is patent it may be taken that the average decrease of output is well under 30 million tons per annum; and this happens to be the extent of the reduction of exports in each of the first two years of the war. The amount of coal that was allowed to leave our shores was 29,566,410 tons less in the war year ending July, 1915, than in the normal year ending July, 1914; and during the war year to July, 1916, the reduction of exports was 29,511,870 tons compared with the year ending July, 1914, or practically the same amount. This all goes to show that, on balance, the amount of coal actually available for home consumption is much about the same as before the war. There is considerable satisfaction in this; for the statistics do not confirm the shortage, which is in the coal industry conveniently made the excuse for so many misdoings—such as deficiency of supply under contracts, the diversion of coal from contract customers to the open market and to more lucrative customers, and for the cunning which results in a profitable evasion of the Price of Coal (Limitation) Act.

While referring to this matter of the counterpoise given by the reduction of exports to reduction of output, we may, for the sake of maintaining in our columns the month by month record of the reduction of exports in comparison with the immediate pre-war year, give the figures for July. In the last peace month—July, 1914—the quantity of coal exported was 6,599,481 tons; last month the quantity of coal that left our shores for other countries was 3,304,117 tons—a reduction of 3,295,364 tons, which amount is a further gain of 235,000 tons upon the reduction of July, 1915, over July, 1914. This is gratifying to home users, although not so to the colliery owners, who prefer the super-fat prices of foreign buyers to the fat ones of home purchasers. The coke exports to July again show an advance—being 29,431 tons better than in July, 1914, and 70,450 tons better than in July, 1915.

Trials of Irish Gas-Works—Carburetted Hydrogen Plant Helps.

ENGLISH gas engineers have during the war been so absorbed by their own worries that they have not given much thought to the considerable anxieties of their colleagues in Ireland. The gas-works of the Emerald Isle are always prejudiced by their geographical circumstances, and their dependence for raw material upon England or Scotland. But now with the initial cost of coal greater, the difficulty of obtaining steamships, the heavy rates of freights (all the coal is seaborne), sometimes not an ounce of coal to be found on the works, and there has to be a scraping round to get what small supplies are available—well, the managers

of those works may be pardoned for entertaining the view that the position of their English and Scotch *confrères* is highly fortunate and enviable in comparison. Brains and resource are always wanted in the conduct of the business of gas supply; but as essentials they were never in greater request than to-day, and particularly in those small gas-works of Ireland that are denied the same conveniences of proximity to, and communication with, requirements that the gas-works of England possess.

We are not romancing. The homely address [see *ante*, p. 300] delivered by Mr. J. E. Enright, of Tralee, at the annual meeting of the Irish Association of Gas Managers, together with the discussion opened by Mr. George Airth, as published to-day, tell plainly of the force of the hard circumstances, and submit protest against the rampancy of undue profit-making without anyone in authority attempting to render relief through the aid of regulation. Relief ought to commence where it is most wanted; and of all places where it is most required in the United Kingdom, particularly in respect of regular coal supplies, there has been most neglect during the war. The Board of Trade simply will not receive a deputation from Ireland to discuss the subject with them. All representations are met with a *non possumus*, and those making them are referred to the Coal and Coke Supplies Committees in the areas of this country from which the coal comes. Our Irish friends find these Committees excellent illustrations of *culs de sac*. This treatment is unfair; and we sympathize with the Irish gas managers. Take the case of Tralee. Before the war the cost of coal delivered to the President's works was 22s. per ton, made up of 14s. 6d. for coal, 5s. 6d. freight, and 2s. for lighterage and cartage. Now the cost of coal is 22s. per ton, and the rate of freight 22s. How on earth is a small Irish gas-works to get on—it is more likely to "get out"—with coal at (say) 46s. per ton delivered, and, when odd lots have to be picked up locally, at something like 57s. a ton? The Price of Coal (Limitation) Act vies with the Board of Trade in helplessness in affording any relief to the Irish gas-works. But the increase in the cost of the coal itself could be temporarily tolerated, if only better transport conditions and rates were maintained between England and Ireland. The gas-works there are simply being starved, and the community robbed, by what is going on; and, unless something is done in the direction of relief, there will be, Mr. Enright warns, disaster for not a few works. "If carrying companies are not prevented from charging freights out of all proportion to the "exigencies of even war times, . . . many gas-works "in Ireland will have to close-down, with consequent loss "and inconvenience to a large section of the community." And in another place, in connection with another topic, he speaks of the saving of many of these gas-works from "bankruptcy." The word is not a nice one. But it assists to force home the jeopardy in which the smaller of the Irish gas undertakings are placed to-day. A resolution was passed, at the close of the discussion, urging upon the Government the "extreme and immediate necessity" for adopting such measures as will assure an adequate supply of coal at reasonable prices, including carriage; but this resolution will be of no avail unless followed by vigorous and persistent action.

Although at times since the war started, Mr. Enright has not had an ounce of coal upon his works, it has not been necessary for him to cut-down the supply of gas in any way; and for this he thanks the carburetted hydrogen gas plant which he possesses as an auxiliary to the coal-gas plant. The application to his gas-manufacturing plant of the old precept as to not putting all one's eggs in a single basket, has turned out excellently for him; and the inhabitants of Tralee have been saved some very unpleasant experiences through the possession of the dual system of gas making. Moreover, the auxiliary method is a cheap one where or when raw materials are dear. It has in these times been found quite convenient to displace dear war-priced oil by home-produced tar; and, the coke being also home made, the carburetted hydrogen gas has been put into the holder at 9·55d. per 1000 cubic feet—the guarantee being 1s. with coke at 20s. per ton, and oil at 6d. per gallon. The 9·55d. is based upon the working during the month of June, when about half coal gas and half carburetted hydrogen gas were being made—the average calorific value being 500 B.Th.U. Yet there is confidence on the part of Mr. Enright that these results (the details of which are given in the address) can be improved upon. The plant has proved its flexibility. Tar can be used as well as oil; it is indifferent as to the kind of solid gas-making material employed in it; and quality of gas can be controlled within the limits of the materials dealt with. During these times of stress, the Tralee plant has resulted in a lessened purchase of coal; so that there has been less coal to transport, and consequently there has been considerable relief to Mr. Enright. The plant, too, has on several occasions maintained the supply when there has not been coal in store with which to manufacture coal gas. There are not a few gas managers in Ireland who wish they had, through these exceptionally difficult times, been placed in the same strong position. This good experience prompts a broader view as to the future of the plant in the production of utility and efficiency in the smaller works. The President is looking to carbonize in the plant a good coking cannel, which will yield with this process about 40,000 cubic feet of 450 to 500 B.Th.U. gas. This looks well on paper. However, Tralee has good reason to be very thankful to the plant—it has in these times proved its economy and faithfulness. For many small Irish works, the outlook is black. They have not been in the past models of prosperity, as prosperity is measured in the gas industry; they are less likely to be so in future with dearer coal. But practical experience with the auxiliary carburetted hydrogen plant has engendered the belief in Mr. Enright's mind that it is destined to save from bankruptcy many indigent Irish works that are to-day seriously battling with adversity. We hope he is right.

Contractors' "Agents" or Engineers.

Experience goes to show that, even with some of the most large-hearted of men, the sense of justice is not consistently conspicuous, in relation perhaps to quite common affairs of life, through opinions upon them having been formed and settled from too narrow a point of view. A little admonition has been administered to us, which we are not as yet convinced, through the absence of any argument, that we deserve. We are sorry to see, too—especially coming from an old friend—the misrepresentation that accompanied the admonition. Not much was said; but it was a case of *multum in parvo*. It will be found towards the end of the remarks of the Chairman (Mr. H. E. Jones) at the meeting of the Wandsworth, Wimbledon, and Epsom District Gas Company. Mr. Jones is always frank and plain spoken; and so he will not object to anyone else being the same. He was passing a merited encomium upon the Engineer of the Company (Mr. H. O. Carr), and said what was very true of him, that he was "a thorough engineer, and not a "contractor's agent;" but he added after "contractor's "agent" what was not true of us, "such as they were now "told in one of the technical papers should be admitted to "their technical organization."

Nowhere can Mr. Jones find that we have suggested that contractors' "agents" should become members of the Institution of Gas Engineers. What we have suggested is that the trained and specialist engineers on the staffs of gas-engineering contractors should be admitted to membership of the Institution. The technical members of the staff of an engineering contractor have, by their training, qualification, merit, and experience, as much right as—in fact, more right than—a number of the members of the Institution of Gas "Engineers" to the position, recognition, and privileges of an engineer. We say this without intending derogation of any Institution members. It is simply true; and many men who are not trained "engineers" are excellent managers of works, processes, and men. Mr. Jones apparently cannot understand or recognize that there are men connected with large engineering establishments who are entitled by qualification to be described as "engineers;" and so he prefers to call them contractors' "agents." Just recently, the South Metropolitan Gas Company appointed a gentleman who is proud to be by profession a mechanical engineer, and to have been trained in, and associated with, an eminent engineering contracting firm. Applying Mr. Jones's description, we must assume that he would have us understand that before this gentleman became associated with the South Metropolitan Gas Company, he was a "contractor's agent," and not a contractor's engineer; but the transfer of his services metamorphosed him into an engineer. The change from one state to the other was a quick one. The use of the term as Mr. Jones applied it—Mr. Carr being a "thorough engineer, "and not a contractor's agent"—suggests that Mr. Jones intended the term "agent" to be one of reproach, and one showing the wide gulf—a chimerical wide gulf—that exists

between engineers whose training and experience have been realized in different directions, and under different circumstances. There are honest men among contractors; there are more genuine engineers to be found in engineering contractors' establishments than are to be found in some other places of which there is knowledge where the title is used and misapplied; and there are contractors' engineers who would recoil from the application of any depreciatory term to men who use the title "engineer," although without the equivalent qualification and the experience that they themselves clearly possess.

Then there was something else said by Mr. Jones. "Mr. "Carr is independent of any contractor's corruption." No one would deny that. But we have just remarked that there are honest men among contractors; and we have yet to learn that "corruption" is a universal practice among contractors where it can be applied. It was further remarked by Mr. Jones that "it has lately been suggested "that the Prevention of Corruption Act should be mixed up "with the proceedings of gas engineers." He was evidently referring here not to anything said editorially, but to a letter that appeared on p. 218 of our issue of Aug. 1. There was nothing very terrible about the suggestion. Corruption of the kind in view has largely died out in the gas industry; that it still exists—if it exists at all—is due to the few men who demand, and are willing to receive. If there were no recipients, there would be no corruption. Who is the weaker—the giver or the receiver? However, this is not a nice subject. Mr. Jones thinks it a most "melancholy" thing that the questions referred to in this article, and which he has helped by his remarks to keep alive, should have been discussed in public. The more melancholy thing is to find Mr. Jones refusing "to call a spade a spade," and placing to our account a suggestion that we certainly have never made. Our suggestion referred to "engineers," and not to "agents."

The Gas Industry and the Supply of High Explosives.

It was a remarkable tale the Minister of Munitions (Mr. Montagu) related to the House of Commons last Tuesday night as to the mobilization of the country for munitions production. It has been a miraculous piece of work, which has now reached a condition of organization and power when it is possible for the Minister of Munitions to stand up in the House, and smilingly tell Germany that had she at one time been wise enough, or in a position, to take advantage of the poverty of this country and her Allies in high explosives and other munitions, she could have had matters very much her own way. The country is grateful to Germany for her shortsightedness or inability, which gave this country time to convert itself into a large arsenal, and so largely gain productive strength. Mr. Montagu also confessed that this country knew very little at the beginning of the war about "T.N.T.;" and he incidentally referred to the fact that this has been rectified by research and by "the new plant which the enterprise and initiative of Lord Moulton's department have established in many gas-works throughout the country." Mr. Montagu had much material for his long narrative; but we should have been pleased to see a little direct acknowledgment made in the House of the "enterprise and initiative" of those who have the conduct of gas-works. The omission was probably an oversight, through Mr. Montagu not having been long at the head of the Ministry of Munitions, and so not grounded in the whole of the facts relating to the production of benzol and toluol.

Must not Slacken in Effort or Output.

The figures Mr. Montagu gave, which show the development of production that has taken place in ammunition and guns of all classes and calibres, have been widely published in the newspapers; and they prove the pressure that exists for increasing rather than slackening effort in production. For example, just think of this: "The weekly consumption of high explosives in ammunition of all kinds is now between 11,000 and 12,000 times the amount required for land service ammunition manufactured in September, 1914. Through their necessity, this country is also sending to her Allies the constituents of explosives in very considerable quantities. Therefore the producers of high explosives and the munition workers of this country may flatter themselves that they have borne some part in the glorious victories of Russia, Italy, and France. Three passages taken from a verbatim report of Mr. Montagu's speech should act as an additional incentive to producers of high explosives. "It is true that the expenditure of heavy ammunition during the last month has been more than double the amount that only eight months ago was thought to be wanted at the time." "If workers and employers continue to play their part nobly, as they are doing to-day, there is now no fear that the present offensive will be brought to a premature conclusion by shortage of ammunition." Further, "against such an enemy as Germany, we can never afford to stand still, even for an instant."

Working-up Residuals after the War.

The Government have also from the war learned something which will be of future advantage to the country and to the gas industry. At the beginning of the war, said Mr. Montagu, "Germany was able to mobilize her second line of industrial defence, and to use her dye-works and fine chemical works by turning them into explosive factories." There is an important lesson in this. At most gas-works, plant has been erected which can be utilized in times of peace for other purposes of material advantage to the country than the one of contributing to the production of high explosives. Mr. Montagu pertinently asked, "Can we not apply to peacefulness the form of organization represented by the Ministry of Munitions?" So far as the new auxiliary plant in gas-works is concerned, the answer is "Yes." Gas undertakings are contemplating this; the war having helped them to appreciate one direction of development, and to hasten it, in a manner that nothing else could have done. What Mr. H. E. Jones said on the subject, in his address last Tuesday to the proprietors of the Wandsworth, Wimbledon, and Epsom Gas Company, admirably represents the feeling of the gas industry. What the Company are now doing for the Government has led the Directors to think that it would be wise to extend their processes, so as, after the war, to deal with their own residual products. It seems only sensible and economical that the secondary raw materials of gas manufacture should be dealt with at the place of production, and so save dealings with, and carriage to, manufacturers at a distance. All that is lost through the present procedure has to be paid for by the consumers—the gas consumer and the consumer of the products from the residual material share in defraying that loss. Therefore, as Mr. Jones remarks, those administering gas undertakings intend not only to have the profit from their residuals, but to control the business, which is reasonable and proper in the interests of all, and more particularly in that of national efficiency and economy.

Municipal Savings Bank Scheme.

There seems to have been a somewhat curious misunderstanding over the Municipal Savings Bank (War Loan Investment), No. 2 Bill. It was stated in last week's issue that, when there was mention of the Bill in the House of Commons, the statement was made that there would be opposition from the bankers; and this was followed by an intimation that if serious objection was manifested, the measure would not be pressed. On this, the prospects of the Bill getting through the Commons during the present session did not appear to be very bright. But the unexpected happened. Last Tuesday, Mr. M'Kinnon Wood, in his position as Financial Secretary to the Treasury, without much in the way of preliminary advertisement, moved the second reading of the Bill, which he pointed out was suggested by the Birmingham Corporation, with the idea of providing machinery by which working people willing to contribute small sums of money weekly through their employers might find a means of handing it over to the Government through a municipal savings bank. The bank was only to be carried on during the war, and for three months after the expiration of it. The whole of the money would be used for national purposes; and the rate of interest payable would be 3½ per cent. Only towns with large populations would be permitted to start these banks. Then the question of opposition was introduced. Mr. M'Kinnon Wood said an intimation had been received that the Bill would not be opposed by the bankers, as it was evidently drafted with a view to meet their objections to the first Bill; but Sir F. Banbury declared that there was some misunderstanding about this communication. No doubt he was quite correct in his contention that the rates are not meant to be used for guaranteeing financial schemes of this kind;

but the times are not normal, and while only one thing matters we must refrain from judging novel propositions by ordinary standards. Whatever may be his ideas as to the bankers' views, or his own opinion on the measure, he did not take the matter to a division; and the Bill was read a second and third time, and passed through Committee on the following day.

The Government and Low-Temperature Carbonization.

Misfortune dogs the steps of the Coalite people. A jubilant song has been sung about the Barnsley Smokeless Fuel Company—one of the descendants of the money-dissipating Coalite venture—and about the confidence the Government had displayed in it by taking £10,000 in debentures; the idea being that the concern would render wonderful service in the production of some of the needfuls for explosives making. This is one of the instances where the Government did not look very carefully before they took the leap. The process and its value to the Government were never, so far as we can gather, thoroughly investigated on their behalf; or, if they were, somehow or other a slip was made. Dr. Addison practically acknowledged this when, the other night in the House, he admitted that it was "doubtful whether the process would prove of much service in the production of munitions," and that the coke was of small value for smelting purposes. Of course. And it would be a technically ignorant person who thought otherwise. Because of the doubt as to the process proving of service, and because of the slow progress made in the erection of the plant, the Government are indisposed to further assist the Company. Whether the whole of the £10,000 will be lost to the nation is not clear; but evidently a good part of it will be, seeing that Dr. Addison's remark, "I do not think it will all be lost," is characterized by a beautiful uncertainty. However, it is fortunate that the amount is not more than £10,000; but it has been an expensively purchased piece of experience.

Small Gas-Works Economies.

A paper, bearing the above title, was read by Mr. S. Moore, of Portrush, at last week's meeting of the Irish Association of Gas Managers. If it does nothing else, it makes us appreciate the difficulties with which the manager of a small works has to contend; but, in some instances, the economy effected by improvised means and at the expense of efficiency appears akin to being penny wise and pound foolish. For example, Mr. Moore states, in the course of his reply to the discussion, that "a retort-house governor was a thing to be longed for; but he was in the position of not having any prospect of getting such a thing." With the installation of a retort-house governor, Mr. Moore would be able to improve upon his make per ton of coal carbonized; and the increase in revenue thus obtained per ton of coal would soon wipe out the cost of the governor. His remarks on utilizing waste products are certainly novel, and in some cases the results obtained are not what one would expect. Take, for instance, the use of liquor as one of the constituents of the "Mirror" metal polish. The ammonium sulphide in the liquor would have a severe tarnishing effect on metal through the formation of sulphides.

Extension of Unemployment Insurance.—A deputation from the Institution of Gas Engineers had an interview with the Umpire on the 16th inst. with reference to the bearing of the National Insurance (Part II.) (Munition Workers) Act, 1916, on employees of gas undertakings. It was also urged that the decision already given should be reconsidered—viz., that contributions are payable in respect of workmen engaged in the repair of gas-cookers, &c. The Umpire undertook to consider the facts which had been laid before him, and hoped to announce his decision in the course of a few days.

German Illuminating Engineering Society.—It is announced that the third annual meeting of this Society will be held at Nuremberg, on Saturday, Sept. 16, under the presidency of Professor E. Warburg. After receiving the annual report, electing a new Council and officers, and choosing the date and place for the next gathering, the meeting will hear and discuss the following papers, which may be supplemented by others: "Technical Aspects of the Cathode Rays," by Dr. Norden, of Berlin; "The Limits of the Production of Light by Temperature Radiation, the So-Called Mechanical Equivalent of Light, and the Prevalent Incandescent Lamps," by Dr. Meyer, of Berlin; and "Factory Lighting," by Dr. N. A. Halbertsma, of Frankfort-on-the-Maine. Those attending the meeting will sup together in the evening, and an excursion to Rothenburg, in Bavaria, has been arranged for the following day.

OBITUARY.

The death is announced as having taken place on the 14th inst. of Mr. Rowland Watkin Lewis, aged 69. He was principal of the firm of Messrs. Edwin Lewis and Sons, tube manufacturers, of Wolverhampton.

Lieut. Albert Armitage Nuttall—according to an official telegram received by his father, Mr. R. H. Nuttall, the Gas Manager under the Marsden Urban District Council—has died of wounds received in action on Aug. 15. Lieut. Nuttall was twenty years of age, and was gazetted on Aug. 23 last year, after serving in the Manchester University Contingent Senior Division O.T.C. He left for France only seven weeks ago. For two years he was with the National Gas-Engine Company, at Ashton, where he secured a scholarship tenable at the Manchester School of Technology, and he was taking the full three years' course in engineering when he joined the colours.

Lieut. Joseph O. Later, who before the war was employed in the Water Department of the Manchester Corporation, has died of wounds received in action. In a notice of his death which appears in the "Manchester Municipal Officers' Guild Journal" it is stated that Lieut. Later rejoined the East Lancashire Royal Engineers (Territorials) on the outbreak of war. In September, 1914, when the East Lancashires left England for Egypt, he was appointed lance-corporal, and further promoted to corporal and sergeant while in Gallipoli. Subsequently he transferred to the Australian School of Instruction, near Cairo, for examination for a commission, which he received on Nov. 7 last year. He was then attached to the 1st Battalion Lancashire Fusiliers; but with the formation of the 86th Machine Gun Brigade he was posted to that corps. In the offensive which began on July 1 he was wounded in both thighs, and died at the Fazakerley Hospital, Liverpool, on the 13th ult.

PERSONAL.

Mr. Henry Woodall has been appointed a Director of the Danish Gas Company in succession to his father, the late Sir Corbet Woodall, who occupied the chair for many years, and (as already intimated in the "Journal") who was succeeded in the office by Mr. R. S. Gardiner.

On Monday last week, at Tay Works, Bonnington, Edinburgh (in the absence of Lieut.-Col. W. Carmichael Peebles, Managing-Director, on active service), Mr. Grieve, the Manager of Messrs. Peebles and Co., Limited, presented, on behalf of the workpeople and staff, a very handsome timepiece to Mr. B. Sutherland, the Secretary of the Company, on the occasion of his forthcoming marriage.

Mr. W. H. Ellis, the Managing-Director of Messrs. John Brown and Co., Limited, of Sheffield and Clydebank, was last week elected Master of the Cutlers' Company of Hallamshire for the third year in succession. It is half-a-century since a Master held the position for three years. Colonel H. K. Stephenson, one of the Directors of the Sheffield United Gaslight Company, was re-appointed Junior Warden.

In their recently-issued reports the Directors of the Herne Bay Water-Works Company and the West Surrey Water Company announced "with deep regret" the death of Mr. John William Docwra, who was a Director of the Companies from August, 1880 and 1891, respectively. The vacancy thus caused has in each case been filled by the election of Mr. Colin Docwra, who had been a shareholder in the Companies for many years.

Lieut.-Colonel J. R. Davidson, C.M.G., D.S.O., the Commander of the Liverpool Scottish, who in private life is Chief Engineer of the Liverpool Corporation Water-Works, has been wounded (though happily not seriously), and is now in hospital at Manchester. He joined the Scottish (Territorials) as a private in 1900, and rose rapidly to the position of Major. He went to the front with the regiment in 1914, and last year was made Lieut.-Colonel. He was appointed Chief Water Engineer at Liverpool in 1914—succeeding Mr. Parry in the position.

Mr. G. Whitlock, the Superintendent Engineer at Timsbury of the South Hants Water-Works Company, for the past 25 years, has retired owing to ill-health; and the Directors, in consideration of his long and valued services, have voted him an appropriate retiring allowance. It was reported at the recent meeting of shareholders in the Company that during the 25 years Mr. Whitlock had never once slept away from the works. The Directors have appointed Mr. L. C. Wright, of the Union-Castle Line, to take up the work under the supervision of Mr. Whitlock.

Mr. Walter Dunlop, the newly-appointed Manager of the Cardenden Gas-Works, has (says the "Dundee Advertiser") now taken up duty there. He was chosen from fifty applicants. Mr. Dunlop has had a large and varied experience in gas-works. He received his early training under his father, and gained considerable experience in the erection and working of retorts and obtaining a good chemical training. He then proceeded to New Zealand, and for three years acted for the New Zealand Coal and Oil Company. On returning to this country he received an appointment at the Granton Gas-Works under Mr. W. R. Herring, and was there three years. Eight years ago he was appointed

Works Superintendent at the Kirkcaldy Corporation Gas-Works. He is a Past-President of the Scottish Junior Gas Association (Eastern Division); having held office in 1910 and 1911.

THE GAS ENGINEERSHIP AT BIRKENHEAD.

At the meeting on Thursday last of the Birkenhead Corporation Gas Committee, Mr. R. H. Brown, the Deputy Gas Engineer, was selected for the position vacated by Mr. T. O. Paterson. The appointment of Mr. Brown is subject to confirmation at the September meeting of the Corporation. There were originally twenty applicants for the position. These were first reduced to six, and subsequently to two. The final selection of Mr. Brown was only on the casting vote of the Chairman of the Gas Committee—the two applicants receiving an equal number of votes from the rest of the members of the Committee.

Mr. Brown, who is forty-one years of age, was educated at the Goldsmiths' College, New Cross, and then at the Regent Street Polytechnic. For four years he was articled to Messrs. Bryan Donkin and Co., and for two years he was employed as draughtsman by Messrs. Samuel Cutler and Sons. Then he served for seven years as Assistant Consulting Manager to the latter firm, and had the supervising of numerous works in England, Italy, the Far East, and South America. After two years as Constructional Assistant at the South Shields Gas-Works, Mr. Brown entered the service of the Birkenhead Corporation about nine years ago. The first two years of this period he served as Chief Draughtsman at the gas-works, and for the last seven years he has been Chief Assistant and Deputy Gas Engineer. For most of the important work in connection with the Gas Department of the Corporation he has of recent years been almost solely responsible. Mr. Brown holds the City and Guilds of London certificates, and full certificates for gas engineering, gas manufacture, and gas supply. He was elected an associate member of the Institution of Mechanical Engineers in 1908. Mr. Brown has previously been in the short list for several important positions—being one of the last three for the gas managership at Blackburn. The salary attached to the Birkenhead appointment is £650 a year to commence with, rising to £800 in three years' time.

The "Liverpool Courier" says that Mr. Brown's appointment will not be allowed to pass without severe comment from the Labour Party, who have not forgotten the great service he rendered to the town during the gas-workers' strike in 1914. It will be remembered that the "Bantams" volunteered to do the stoking at the works; and it was through their loyalty that the town and all the different institutions (including the hospitals) were kept supplied with gas. . . . Mr. Brown showed great resourcefulness in that crisis; and it is sufficient to remark that the trouble was surmounted and peace restored. Mr. Brown has been accused by the Labour men of having used unfair methods during the strike. On these and other grounds, opposition to his appointment may be looked for.

THE RECENT GAS EXAMINATIONS.

Official Statistics of "Passes."

The Secretary of the Institution of Gas Engineers (Mr. Walter T. Dunn) has received from the Department of Technology of the City and Guilds of London Institute, the following figures relating to the candidates who entered for this year's examinations in the subjects of "Gas Engineering," "Gas Supply," and "Gas-Fitting."

		Number of Candidates.	Passed		Failed.
			First.	Second.	
Gas Engineering .	Grade I.	63	12	35	16
	Final	46	3	34	9
Gas Supply . . .	Grade I.	65	32	26	7
	Final	37	7	10	20
Gas Fitting . . .	Grade I.	51	33		18
	Grade II.	60	46		14
	Final	36	24	5	7

[The names of a large proportion of those who passed have already been given in the pages of the "Journal"—see *ante*, pp. 111, 154, 203, 254.]

We have received from Messrs. Raggett and Co. a copy of a book entitled "The Manufacture of Carbide of Calcium," by Charles Bingham. The work is published at 5s. net.

At next month's meeting of the British Association in Newcastle-on-Tyne, Professor William A. Bone, D.Sc., F.R.S., is to give one of the two evening discourses—taking for his subject, on Thursday, the 7th prox., "Flame and Flameless Combustion," with experimental illustrations. The lecture will review and illustrate some recent advances in connection with the scientific knowledge of flame and the intensification of ordinary flame combustion.

THE INFLUENCE OF THE WAR ON THE GAS INDUSTRY.

A German Review.

The following is a summary of the chief points of the address on this topic which Herr M. Hase, the Manager of the Lubeck Gas, Electricity, and Water Works, gave, in the capacity of President of the German Association of Gas and Water Engineers, at the General Meeting of the Association in Berlin on June 28.

The prolonged war has naturally brought new problems before the gas industry and some attendant difficulties; but it has done the industry the service of impressing on wide circles a knowledge of the great economical importance of gas. The war has accomplished at one stroke what years of patient endeavour failed to achieve fully; and the gas industry has now received due recognition of its worth in affording the most favourable and thorough utilization of coal, and in providing bye-products which are indispensable for the fulfilment of problems of national importance. Gas stands foremost as a substitute for petroleum; and on this account Germany has adopted every measure, not merely to avoid any restriction in the production of coal gas, but to stimulate the production. Thanks also to decades of strenuous technical and scientific preparation, the gas industry was ready for the introduction of new branches of manufacture, and to undertake heavier tasks with good results in the direction of rendering Germany independent of imports and prepared to face the commercial struggle with her enemies.

The time is not ripe to go into details of the manner in which German gas-works have equipped themselves to assist in the struggle; but attention may be drawn to two points—viz.: (1) The adoption of measures to increase the productive capacity of gas-works' plant—*e.g.*, by the introduction of carbonizing methods which have been perfected technically and economically; and (2) the adoption of measures for facilitating and furthering the output of gas—*e.g.*, by favourable rates of charge, the introduction of prepayment meters, the distribution of gas at higher pressures, opening new fields of consumption, especially of an industrial nature, and notably distribution from large central gas-works to outlying places.

Not long since—say, 20 years ago—the single horizontal retort charged by hand held a monopoly; whereas in 1914 there were in 100 of the largest German gas-works 11,042 horizontal retorts, 7710 inclined retorts, 5605 vertical retorts, and 728 large carbonizing chambers. Thus horizontal retorts are already in a minority, and, moreover, their character has changed for the most part from the "single" to the "through" retort with mechanical stoking. Frequently horizontal retorts are only being retained as emergency plant; the regular work being done with the more economical vertical retorts and large chambers, while several gas-works take a supply of gas from coke-oven works. The average make of gas per ton of coal in 87 large German gas-works has risen from 10,585 cubic feet in 1893 to 11,626 cubic feet in 1913, which means a gain of about 5120 million cubic feet of gas per annum, through the better utilization of the coal carbonized. At the same time, also, the coke obtained has risen from 64·7 per cent. of the weight of coal carbonized in 1893 to 70·8 per cent. in 1913, which represents a gain of 300,000 tons of coke per annum.

Outside the gas-works, measures have been adopted for increasing the employment of gas. The fanciful notion which was prevalent before the war—that gas would in the near future be restricted to a few fields of operation to which it was specially suited—has been dispelled once and for all, and the seal has been set by the war on a more extended charter for the gas industry. In the words of the last report of the German Central Gas Bureau: "It is for the gas industry to take care that coal, the most important German treasure of the earth, disburses without loss the wealth of materials which it contains, and that to this end the combustion of raw coal, not merely for household but also for industrial purposes, is continually displaced in favour of gas." It is, indeed, not surprising that, even before the war, there was a continuous and highly gratifying expansion in the use of gas. Thus 80 German gas undertakings, supplying populations aggregating 14¼ million people, in the last decade but one showed an increase of 85 per cent. in output, and in the last decade (ending with and including the year 1913) an increase of 78 per cent. The average consumption of gas per annum per head of the population was 1942 cubic feet in 1893, 2684 cubic feet in 1903, and 3708 cubic feet in 1913.

Effect of the War on Gas Consumption.

At first the war interrupted the natural expansion of the gas industry; so that from August, 1914, to May, 1915, there was a decrease in the output from German gas-works which averaged 3·8 per cent.; but from June, 1915, onwards the output has increased. Thus the consumption from large and moderate-sized works in 1915-16 has averaged 6 per cent. more than in 1913-14—the period immediately before the outbreak of war. This increase would have been greater but for artificial obstacles, such as restrictions of all sorts, the inadequate productive capacity of many works, shortage of materials, &c. It is of interest to note that gas-works situated close to the field of war—*e.g.*, at Memel, Allenstein, Insterburg, and Tilsit—have had exceptionally large increases in output, owing primarily to the military traffic, but partly to low

charges and the greater use of gas for industrial purposes. Diminution of gas consumption has been caused by general economy, breaking-up and reduction of households, less business at public houses and restaurants, suppression of festivities, bad business and earlier closing hours, depression in many industries, especially in connection with the export trade, shorter working hours, and reduced public lighting. On the other hand, increase of gas consumption has been brought about chiefly owing to growth in the number of consumers in consequence of scarcity of petroleum, to the use of coal gas in place of oil gas for railway carriage lighting, to the scarcity of fuel, to the supply of military buildings, hospitals, &c., as well as industries and plant engaged in war work, and to the growth of home work for war purposes, &c.

The prospects of development of the gas industry in the future are bright. Increasing calls on gas-works may be anticipated when peace brings a great revival of commerce, and the present enforced economy ends. In addition to the continued replacement of petroleum by gas for lighting purposes, there will be new outlets for gas which the war has disclosed, such as the lighting of railway carriages by coal gas, the use of gas in industries and trades—*e.g.*, bakeries, large kitchens, &c.—as well as the supply of villages and outlying communities. Gas firing will extend for annealing, smelting, welding, and general industrial heating in workshops and engineering works. The war has advanced by a long stride the question of the economical utilization of coal, and it is now recognized that the monstrous wastefulness of the wealth locked up in coal will be checked by the extension of the use of gas in industry and for domestic heating in all directions, with collateral hygienic benefits to the population.

Effect of Summer "Time."

It would be premature yet to express definite views on the effect of summer "time" (which was introduced in Germany on May 1 last) on the consumption of gas. Any ill-effect thereof has been felt far more heavily by electricity than gas-works, as the former are concerned to a predominant extent with lighting, and have not the compensating factor of a heavy day load. Some gas-works indeed welcome the equalizing of the load which the change of time has furthered. At Lubeck, the consumption from 9 to 11 o'clock in the evening—the hours chiefly affected by the change—has fallen off by 18 per cent.; but the comparison is obviously under the influence of other effects of war conditions. The question whether the new time should be retained throughout the year has been studied by Herr Jäckel, the Manager of the Plauen Gas-Works, who contends that the economy of coal consequent thereon in the gas-works of Germany is equivalent to a saving of only about £82,500 from May 1 to Sept. 30, against £231,250 for the whole year. On the other hand, in opposition to the extension are the reduction in the output of coke, tar, and ammonia, and the extension both of artificial lighting in the early morning and of unfavourable working hours.

Rush of New Consumers.

The number of gas consumers has greatly extended. For instance, in Lubeck the working year 1915-16 has seen an increase over 1913-14 of 50 per cent. in the number of consumers, of 31·5 per cent. in the number of ordinary meters fixed, and of 144 per cent. in the number of prepayment meters. Other places report very similar figures. The demand for new services and fittings has indeed frequently been so great that the works themselves have been unable to satisfy the impatient public, and have had to get the assistance of private firms in fitting meters and prepayment installations. Various arrangements were made with these firms, who likewise were suffering from lack of skilled labour; but incidentally the war has helped through this co-operation to reconcile hitherto opposing interests.

Prisoners of War as Gas-Fitters.

Some time ago the Prussian War Office was persuaded to establish courses of instruction in gas-fitting in prisoners' camps, or to train prisoners as fitters in some of the larger gas-works, in order that they might be placed at the disposal of other works. In several districts the results have been satisfactory. The author can testify that in the district of the Ninth Army Corps, the step has dispelled many objections which were brought against it, such as that it would not be practicable to provide the requisite supervision of the prisoners, that it was inexpedient that they should have free intercourse with the public, that it would likely rouse the opposition of industrial workers, that ignorance of the German language would cause trouble, that German workmen would not work with or under prisoners, &c. All these objections, however, fell to the ground in the face of German capacity for organization directed to the finding of new means of replacing deficiencies and of overcoming difficulties.

It now becomes a question of retaining and extending the ground gained—*i.e.*, to prevent millions going abroad for petroleum, to retain them as a source of profit in the home country and thus render it independent of the foreigner. In these troublous times, gas-works, by reducing charges for connections, services, fittings, &c., have given every facility to the people to obtain light and heat through the use of gas. Especially has the extension of prepayment meters been of the greatest utility.

The Shadow on the Wall.

But where there is light there is shadow, and by way of contrast to the agreeable picture drawn above the gas manager has been confronted with difficulties in regard to a sufficiency of good gas coal, scarcity of labour, retrogressive working, and economical results, &c. Despite them, however, the people have received their gas supply as in times of peace.

As to the coal supply, there have been isolated cases of its failure; but, in general, consignments have reached gas-works in time to replenish the depleted stores, and there has been no widespread lack of coal outside the frontier and battlefield areas. At the beginning of the war, recourse was had, in critical cases, to coal of any kind, to railway and factory stocks, and to a more extended use of water-gas plant, where such existed. The short supply of coal was due less to insufficient raising of coal at the pits than to the congestion of railways and the interruption of water transport. At the present time, even places which before the war carbonized English coal wholly or to a large extent have a sufficient supply of German coal, thanks to the action of the Prussian War Office and Ministry of Commerce, which have instructed the collieries to give gas-works a preference over all industries. A supply of good descriptions of coal up to April 1, 1917, is now assured. But the price of coal presents an unpleasing chapter, as in isolated cases it has risen more than 100 per cent., in others 30 to 60 per cent. In hoping for better times, however, it is a matter for congratulation that there is no immediate prospect of a further rise, that neutral countries are at least no better off, and that Germany's enemies, especially her former cousins across the Channel, and her late allies on the Mediterranean, are much more sorely hit. In Italy and France, almost inconceivable conditions prevail; the price of coal having risen by 300 per cent., and freights by 700 per cent. and more. The price of gas has in consequence been raised to figures which in Germany would be considered fabulous. Contrast Germany and England, where the Ministry has requested gas-works to reduce their coal requirements by 10 per cent., and to urge consumers to be sparing in the use of gas. The German gas industry has reason to be gratified that a totally different state of things prevails in Germany.

(To be continued.)

ELECTRICITY SUPPLY MEMORANDA.

The Trend of Affairs and the Lighting Load.

The lighting load is, under present circumstances, still the backbone of the business of a large number of electric-supply stations; but the managements of the stations are not altogether pleased with the way things are shaping. As a matter of fact, if the so-called "half-watt" lamp comes down to domestic units, there will be a number of undertakings that will find their conditions worse than ever. The application of higher efficiency lamps for domestic use would mean lower consumption, and smaller accounts for the heaviest priced units; and, on the other hand, cost of supply is likely to remain for some time to come higher than the past normal—from capital cost to running expenses. The costs of the war are not going to be liquidated for a long time to come; and materials, labour, and manufactured goods will continue at a high price. Thus business development in lighting, given the smaller unit half-watt lamps, would not proceed for the undertakings on the most favourable lines, which are not found in the opposing conditions of heavier cost to supply, and of lower income per consumer. The only thing to be done would be to maintain a higher charge per unit. But against this would come the further economies the gas industry are hoping to realize, by a larger home development of its residuals business, and the superior position it holds in respect of cooking and heating. It is not a happy prospect that the electricity undertakings in residential areas have before them. In those areas where the electricity undertaking has a large power supply—long hour and constant—the engineers will soon be coming to the conclusion that, if the domestic consumption for lighting is much reduced by the adoption of higher efficiency lamps, their concerns would be better off with only the power load, and not the short-hour lighting load with the new lamps. The cooking and heating load for electricity stations will continue to be an infinitesimal and erratic one, and so of the least utility of all the business to an undertaking.

Consumers' Accounts.

Electricity consumers think they have many legitimate grievances; but, of course, this is, so the electricians say, all a mistake. But to convince the consumers of their error is an exceedingly difficult matter. Only the other day a neighbour of the writer—an elderly lady, who had been studying the Board of Trade request for a 10 per cent. reduction of lighting, who has the greatest horror of special constables with a special eye on escaping illumination from residences, and who really saves one hour's lighting per evening—was threatening a breezy visit to the local electricity company's office, because, although she has lowered the number of lights used in her house, the account for last quarter is greater than it was when she had the normal number of lamps going, before economy began to be preached by the Board of Trade, and the lighting decrees came into force. The price per unit has gone up 30 per cent.; but this is 30 per cent. upon the reduced number of units used, and

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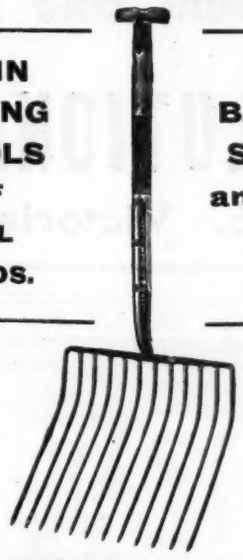

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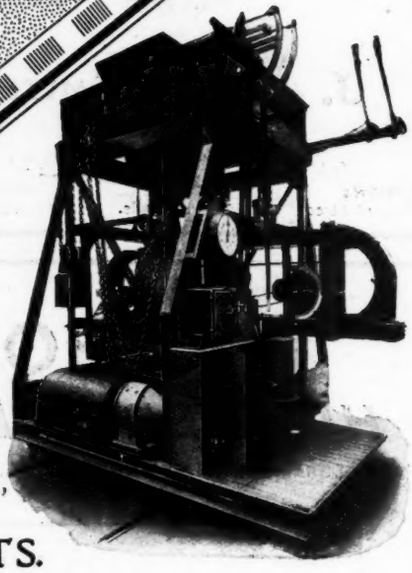

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not upon the aforetime use of current. In addition, a radiator which disgraces the drawing room by its meretricious exterior and mockery as a heating agent, has not been in service a single hour during the quarter. The electricity people are going to have with this lady, if she acts up to her threats, a bad five minutes over the enlarged account. In another case, a consumer who disposed of a couple of units last quarter has been fined for his economy by being called upon to pay the minimum charge; and he has now given instructions that there is no need for his people to economize on the under side of that minimum. These are but examples in a small circle of friends; and the examples are not isolated ones.

Universal Systems and Prices.

An electrical engineer may be an electricity consumer; and we have our suspicions that "A Critical Consumer" who has been writing in the "Electrical Times" is an electrical engineer. He talks with excellent flexibility about alternating currents, direct currents, voltages, and so forth; and such flexibility is not given to the ordinary consumer, however critical and observant. This consumer asks the question, "What Suits the Consumer Best?" This is a vital question. It is one that is not always asked or studied. There is sometimes a proneness on the part of makers of even gas to supply what they think proper, and not to give much heed as to what is best for the consumer. Look at some of the gases rich in luminosity that are still supplied in some places, the heavy hydrocarbon content of which never gets thoroughly aërated, and so there is never complete combustion, but there is consequent waste and discoloration. These are not the conditions that best suit the gas consumers. "A Critical Consumer" says, in relation to electricity supply, that there is never any consultation with users before adopting any particular system, nor does the consumer appear to be consulted in the least. He acknowledges that it would be impossible for each consumer to have the privilege of demanding a direct or an alternating current supply at any voltage or periodicity; but he does think that the views of the majority of users might be taken and acted upon. It is very doubtful whether a majority of the consumers would be capable of making a choice, or know what they were talking about. Then there is no co-ordination of supply; and the result is the appliances a consumer employs in one area may not be of the slightest use to him if he moves into another district, where a different condition of things prevails. Of course, if a standard system or pressure were adopted all over the country, or at least throughout the London district, consumers, the critic points out, would have no cause for complaint, were the system alternating or direct, or if at high or at low voltage. He wants universal perfection—a universal voltage and system, and prices standardized. He ineffectually pretends ignorance in the attempt to hide his technical knowledge. The quality of electricity, he says, is the same everywhere; and if it is worth only 3d. per unit in one part of London, it is worth no more in another part. He must be a dull-witted "Consumer" if he does not know that the factors constituting the costs of production and supply vary considerably. "If the explanation lies in the fact that the cheap supply is given by a local authority, and that the higher price is charged by a company, there seems every reason why the whole of the electric supply business should be under municipal control." Not always. Companies have to conduct their trading on a business and paying basis; but it is not an unknown thing for low charges to prevail in some municipal supply areas, with a rotten financial condition existing—insufficient appropriations for sinking fund, and for maintenance, renewals, obsolescence, and reserves. Even Sheffield has acknowledged wrongdoing in these respects. At the same time, somebody must suffer for this sort of thing. However, "A Critical Consumer" has a decided preference for alternating current, and an equally decided objection to direct current.

Electric Cooking Knowledge in America.

In America, great attention is being paid to the culinary uses of electricity; and an endeavour is being made to give electric cookers, water-heaters, and so forth a good spurt by special propaganda. The Electric Range Committee of the National Electric Light Association make rosy prognostication of what is going to happen. They reckon that on the Pacific Coast and in adjoining areas, 10,000 electric-ranges will be sold this year. From another source, it is seen that, of 2884 American towns, more than one-half charge for electricity for cooking 4 c. to 5 c. per kilowatt-hour, while only 835 have adopted a rate as low as 3 c. or less. These rates would not stand a ghost of a chance on this side. The Globe Stove Company canvassed some twenty cities and towns to ascertain the views of housewives regarding electric cooking. The data obtained showed: 26 per cent. had considered buying electric stoves, 11 per cent. were willing to pay 100 per cent. more than at present, 27 per cent. were willing to pay 50 per cent. more. As to the proved advantages of electric cooking, it was found that 37 per cent. of those canvassed knew electric cooking was cleanly; but only 1 per cent. that it would "save on meat bills." This shows a large percentage of wise people in the cities and towns in question. Then 24 per cent. knew electricity was more convenient, 6 per cent. that it was cooler, and 3 per cent. that it was "safer" than gas. Thank goodness America shows such a very small percentage of foolish housewives. But Mr. P. L. Miles, of the Globe Stove Company, has to acknowledge that the electric cooker is about "twice" as expensive as a gas-range in the States; and therefore he holds that salesmanship is the most efficient factor for securing the more extended use of electric cooking appliances. A well-known electric-stove manufacturer —Mr. George Hughes—expresses the opinion that the cost of the electric-cooking range will always be higher than that of its gas prototype, because of "superior" construction and higher efficiency—according to him, the relation is 85 per cent. and 15 per cent. If this is correct, it does not say much for the efficiency of the American types of gas-range. But when electricians talk of costs, they prefer to push to the fore relative "efficiency" and to the back the question of the expense of the "B.Th.U." employed. This is perhaps natural; but it is only part of the tale. A comment of the "Electrical Review" is that "whatever may be the American conditions, in this country at any rate electric cooking will only come into its own through the agency of general hiring-out arrangements." Among other of the data from America is that "companies supplying some 3 million customers in various parts of the country, report only 21 per cent. as many electric water-heaters in use as electric-ranges." Percentages are rather more indefinite and deceptive than whole numbers.

Demand v. Meter-Rates.

Rate-making was at one time a fine art in the electrical industry. There were certain fundamental principles that used (so it was said) to be faithfully observed in the fixing of electrical tariffs. Then it was found that competition made fidelity to principles impossible; and expediency came in as an uncertain factor. Even with tariffs based upon standard principles, laymen were much worried over the effort to understand how they were arrived at. But now any attempt on their part to comprehend some tariffs is perfectly hopeless. The supreme object appears to be to confound the customer, so as to extract as much money as possible from him, without him being able to appreciate why he is paying so liberally. This is electrically regarded as the art of good salesmanship. The Massachusetts Gas and Electric Light Commissioners have been trying to decide as between the justice of the demand system of charge and of meter-rates as applied to summer resorts. The matter was raised on a petition by the customers of the Vineyard Lighting Company. Certain charges were in force up to June, 1915; but their inadequacy having been proved, the following rates were substituted: "June to September, 25-volt-ampere unit: one unit, $1 per month; two, $1·80; three $2·40; additional units, 60 c. Minimum season charge, 1·5 months' bill; $9 advance payment required. Demand rates, October to May, 60 per cent. of summer rates. Off-peak power, 7 c. per kilowatt-hour. The customers did not like the look of this new schedule of rates, which increased the summer payments particularly of stores, hotels, &c., that formerly enjoyed metered service. The Board came to the conclusion that, with the brief summer business (for which the Company's investment almost entirely provides), the customers must bear nearly the full burden of the plant; and in the circumstances, the Board were of opinion that "it is doubtful whether the metered rate would provide as fair an apportionment of this burden as the respective demands of the customers upon the station." But the Board found that, while a demand basis of rates works fairly in the case of ordinary customers who use their demands steadily, it is not perhaps the case with hotels, stores, and other business places, which have large but intermittent demands, of varying duration. It is common to recognize in rate-making both demand and consumption; but the Board considered that an alternative meter rate offered to business customers would meet objections to the present schedule, and should be extended to users of electricity for cooking and heating from a separate circuit. But the Board did not endorse a demand-rate as being superior to a meter-rate generally. If, in the present case, the load improves, a gradual change to the meter system was suggested. "There are some serious disadvantages in the present plan, and not the least is the uneconomical consumption of current by customers once their demands are established. But this last feature affects so small a proportion of the costs, as compared with any effective plan for correcting it, that it may be neglected until the load-factor improves." The Board recommended the establishment of a 25-cent meter-rate for churches, hotels, and business places, and to users of cooking and heating current, subject to a 5 per cent. discount in summer and 40 per cent. discount the rest of the year. This shows that, given fair conditions of load, the Board prefer the good old-fashioned straightforward system of charging according to actual consumption, rather than introduce the uncertainties of other plans of charging. Uncertainties of the kind generally lead to injustice.

Mr. Arthur M. Tapp, one of the Directors of the Southend Water-Works Company, who died on the 7th ult., left estate valued for probate at £101,657 gross, £95,285 net personalty.

The death occurred suddenly, on the 8th ult., of Mr. Charles Hodgson Osler, Gas Distribution Engineer to the Montreal Light, Heat, and Power Company. Deceased was born at Driffield (Yorks.), and went to Canada when only sixteen years of age. In 1896, he joined as General Superintendent the Company named. Not long ago, he described to the Canadian Gas Association a successful tunnelling scheme for carrying gas-mains which he had carried out.

IRISH ASSOCIATION OF GAS MANAGERS.

Meeting in Dublin last Tuesday.

A YEAR ago it was not found practicable to arrange a meeting of the Association; but last Tuesday the members gathered again in fair numbers, in the City Hall of Dublin, to hear the President (Mr. J. E. Enright, of Tralee) deliver his address, Mr. S. Moore (of Portrush) read a paper, and to discuss the coal question. The meeting, with an adjournment for refreshments on the invitation of the President, lasted well into the afternoon; and in the evening the annual dinner brought a successful day's proceedings to a close.

The meeting was held in the Council Chamber, City Hall, Dublin—Mr. J. E. ENRIGHT, of Tralee (the President), in the chair.

WELCOME TO THE CITY.

The TOWN CLERK (Mr. Henry Campbell), at the opening of the proceedings, said he was desired by the Right Honourable the Lord Mayor of the city to express his regret to them that he was unable to be present, owing to the urgency of Corporation business, which had compelled him to cross to London that morning. Otherwise he would have been very pleased to personally offer the members a hearty welcome to the city, and a warm greeting. Under the circumstances, this duty had been deputed to him (the Town Clerk); and accordingly he tendered to them, on behalf of the Lord Mayor and the citizens of Dublin, a cordial and sympathetic welcome to the old city. He was sorry to say that since the last visit of the Association certain events had happened which had removed some of the most characteristic and the best built parts of the ancient city, and that it did not present to visitors or to residents the familiar appearance that it had done for well over a hundred years past. A great part—the best part, in fact—of the city had unfortunately suffered very badly; but they were hoping for better things, and more favourable circumstances than probably they had had for some time, to bring about the rebuilding on perhaps a better and more useful plan, for business and pleasure, of the destroyed portions of their ancient capital. But, while this dilapidated appearance of the city might cause the members (as it had himself and every good citizen) practically tears, and great worrying, he trusted that the enjoyment of their visit would be none the less great. They in Dublin recognized what an excellent Association it was, and how necessary it was that there should be an organization of this character in connection with such vast undertakings as those involved in gas supply. It kept the members in touch with the most modern appliances, &c.; and every one would remember the great strides which gas lighting had made within a short time. It was very pleasant indeed to find that gas lighting, notwithstanding electricity, had held its place admirably, and so transformed itself as to compete fairly with any improvements made in other forms of illumination. There were great things to be done with gas for power and other purposes, as well as for lighting. As an amateur engineer, he knew all about the appliances required for the production of gas, and about the valuable bye-products resulting from its manufacture—bye-products so useful that he hoped a time would never arrive when gas would disappear.

THE PRESIDENT'S MEDAL.

The TOWN CLERK said he had been requested now to perform another act which gave him very great pleasure. This was to present to Mr. Enright a medal on behalf of the Association to commemorate his year of office. The medal was a beautiful one, and it possessed the virtue of being of Dublin manufacture. He trusted the recipient would live long to wear and enjoy it.

The PRESIDENT assured the members that he appreciated the honour of this presentation more than he could express in words. He felt proud, as a native of Dublin, to receive the medal at the hands of the Town Clerk of the city; and he thanked him for making the presentation, and the members for their handsome gift. He desired also to tender to the Town Clerk, on behalf of the Association, their hearty thanks for so kindly coming down to open the meeting, in the regretted absence of the Lord Mayor.

REPORT OF THE COMMITTEE.

The HON. SECRETARY and TREASURER (Mr. George Airth, of Dundalk) then read the report of the Committee. In this, reference was made to the fact that the last meeting, in 1914, owing to the unsettled condition of the country, was not so well attended as it might have been; and the Committee hoped that in future as many members as could possibly do so would attend. Interchange of opinion would then be secured, which would tend to the advancement of the profession to which they belonged. The coal crisis had given the Committee a great deal of thought. The Association's representative on the Council of the Institution of Gas Engineers had given all the help he could in the deliberations of the Institution; and the Committee had had direct communication with the Board of Trade, with what result had been seen by the communication sent out to each member. The South Wales coalowners had been granted permission to charge 28. 6d. per ton extra over and above the excess war price of 4s.; so thatthe Committee's labours did not seem to have had any success. The resentment of the miners to this proposal might—the Committee hoped would—result in this injustice being withdrawn, or at least being withheld from other coalfields. Several members—Messrs. C. W. Stott (Parsonstown), W. Walker (Hillsborough), R. Woods (Dublin), L. L. Nuzum (Dublin), and W. Blair (Helensburgh)—had passed away since the last meeting, and others had lost relatives or friends—Mrs. Whimster (Armagh), Mrs. Henry Hawkins (Limerick), and Mrs. Kirkham (Enniscorthy). To all the sorrowing ones, the Association extended their deepest sympathies. The accounts and the Auditor's report showed a balance of £61 9s. 2d.

The AUDITOR (Mr. G. W. Norman, of Dublin) then read his report and an abstract of the accounts.

The reports were adopted on the proposition of Mr. J. TAYLOR (Coleraine), seconded by Mr. H. W. SAVILLE (Drogheda).

REPORT OF THE DISTRICT REPRESENTATIVE ON THE COUNCIL OF THE INSTITUTION OF GAS ENGINEERS.

The PRESIDENT said, as district representative of the Association on the Council of the Institution of Gas Engineers, he had to report that he had attended all the meetings of the Council (except on one occasion) to which he had been summoned. Many subjects of importance to the industry were discussed at these meetings, including reports of various Committees. But the most important matter, and the one which affected the interests of the Association more than any other, was the subject of coal supplies and price. He regretted to report that, notwithstanding the very strong attitude taken by the Council, no concessions had in any way been afforded by the Board of Trade. Heavy freights were the cause of nearly all the enormous advance in the price of coal in this country; and he could not but express his opinion that the Board of Trade had proved themselves utterly incompetent to deal with the situation.

ELECTION OF DISTRICT REPRESENTATIVE.

The HON. SECRETARY remarked that there had been a meeting of the Committee, at which it had been suggested that the President Elect, whoever he might be, should be the District Representative on the Council of the Institution of Gas Engineers for the year in which he held office as President. He therefore formally proposed this. It was, he thought, really the intention of the Association, when the election of a representative was started, that the President for the time being should serve. Of course, to be eligible the President must be a member of the Institution.

Mr. SAVILLE said he would be glad to second the motion that elected Presidents should automatically become the Association's District Representative.

This was agreed to.

PRESIDENTIAL ADDRESS.

The PRESIDENT next proceeded to deliver his Inaugural Address, which will be found in last week's "JOURNAL" [pp. 300-301]. At its conclusion,

Mr. A. S. BROOK (Lisburn) proposed a hearty vote of thanks to the President. He remarked that the address dealt with many subjects which had occupied the minds of gas managers for a long time. The facts and figures quoted with reference to the new plant which the President had installed would no doubt be very useful to many other managers. He had been looking into the "Transactions" for some time past, and he found that the President read a paper before the Association some years ago. Indeed, he had been an active member ever since he joined. Of course, the rule was not to criticize addresses delivered on such occasions as this. If this had not been the case, there were some things he would have liked to discuss, because what was applicable to one particular works might not be at all suitable for another.

Mr. T. J. REID (Ballina), in seconding, remarked that he had listened with pleasure to the address, the chief interest of which lay, of course, in the topic which had absorbed the attention of all of them for the past two years—the coal supply.

The resolution having been put to the meeting, and carried with applause,

The PRESIDENT said he thanked the members heartily for the kind way in which they had received his address. Under the circumstances, he had thought it would be of more interest to them to deal with something that was touching them acutely at the moment, and to tell them what he had done himself in the way of overcoming the coal difficulty as it had affected him. He might add that he would be only too pleased to show the plant to which he had referred to anybody who wished to see it. Several members had already witnessed its operation, and the ease with which gas was being made. They would get some idea of its effect on

him, when he said he had been able to come away on a fortnight's holiday and leave 8 tons of coal in the gas-works.

Office Bearers and New Members.

Messrs. J. P. Whimster (Glasgow) and T. Duncan (Glasgow), who had been appointed Scrutineers, reported that the following had been unanimously elected.

President.—Mr. A. S. Brook, of Lisburn.
Vice-President.—Mr. H. Kirkham, of New Ross.
Members of Committee.—Mr. W. M. Pettigrew, of Portadown; Mr. A. Kirkham, of Enniscorthy; and Mr. C. B. Outon, of Inchicore, Dublin.
Auditor.—Mr. G. W. Norman, of Dublin.
Hon. Secretary and Treasurer.—Mr. George Airth, of Dundalk.
New Members.—Mr. Malcolm Littlejohn, M.A., B.Sc., of Glasgow; Mr. James Meeke, of Navan; Mr. P. J. Philpott, of Mallow; and Mr. H. Dumbleton, of Dublin.
New Extraordinary Members.—Mr. R. H. Ayton, of Belfast; and Mr. F. H. Ferguson, of Kingstown.

The Hon. Secretary then formally moved, the President seconded, and it was carried, that Mr. Brook be the Association's representative on the Council of the Institution of Gas Engineers.

Place of Next Meeting.

It was agreed that next year's meeting should take place in Belfast.

Small Gas-Works Economies.

Mr. S. Moore (Portrush) submitted a paper entitled "Small Gas-Works Economies: Mechanical, Chemical, Clerical." Taking the written paper as his text, he explained by the aid of samples the various matters referred to therein. The paper with a report of the subsequent discussion, will be found on pp. 347-9.

After Mr. Moore's paper had been disposed of, there was a debate on

THE COAL CRISIS.

Mr. Airth, in opening the discussion, at the request of the President, said that the coal crisis through which they had been passing for a very considerable time had occupied the attention of the Committee of the Association, as well as of himself as Hon. Secretary. To all the ordinary members of the Association, he had sent out a notice, asking them to reply to the four following questions, as it would be necessary, if they could get the Board of Trade to receive a deputation, that they should be well fortified with facts:

(1) What was the price of coal delivered in your works before the war—say, at June 30, 1914, or nearest date?
(2) What are you paying now?
(3) Have you been able to secure a contract for your supplies, and to what date?
(4) If not, how are you being supplied.
Give any other particulars you think will assist the deputation—such as prices free on board, freight rates, steamer or rail, &c., both before the war commenced and now."

At the time the letter was sent out, they thought they might be able to see Mr. Runciman. Of the ordinary members, 57 replied to his queries, and gave very full particulars, for which he was very grateful. The information contained in these replies he had summarized, so as to be able to put it before the Board of Trade, with whom correspondence had taken place, a copy of which had been sent to every member. From this correspondence they would have seen, however, that he had not been successful so far in attaining results of any consequence. On July 10, a letter was addressed to him by Mr. W. F. Marwood, to the effect that he was directed by the Board of Trade to say that the question of the freights charged for the carriage of coal to Ireland and the provision of tonnage for the purpose were then under consideration. Reference was also made to the functions of the Coal and Coke Supplies Committees set up by the Board in the colliery districts, with a view to facilitating the supply of coal to important consumers. The Board, the writer said in conclusion, trusted that by these means the difficulties in regard to supplies might be obviated; and they did not think they need trouble a deputation to attend at present. Of the 108 gas-works in Ireland, 31 came under the Price of Coal (Limitation) Act; and of these four belonged to corporations, 21 to urban district councils, and six were companies having Special Acts. The capital expended on the 31 works which came under the Act was about £3,209,435, and on those not under the Act about £368,565—the total being £3,578,000. The total quantity of coal required per annum to keep these works going, allowing (say) 10,000 cubic feet per ton, was 610,000 tons. Allowing that the largest towns—such as Belfast, Dublin, and Londonderry—were fully supplied, the remainder of the companies and corporations which came under the Limitation Act were still 37,550 tons short of their requirements to make them equal to 1915; and out of 68,560 tons necessary for the other works, only 8555 tons had so far been promised. Advances were being charged by railway and canal companies in Ireland of 31·30 per cent. over 1914 rates. Those who had secured coals at f.o.b. prices, had, despite the Act, done so at an increase of 52·08 per cent.; while freight rates had gone up on an average 229 per cent. The gross percentage by which coals and freights had risen in price, on secured orders, was 79·13 over the 1914 figures. This was only over 55 works in Ireland. The highest increase over 1914 figures was 139·04 per cent., and the lowest 55 per cent. The price of coal in one English town he had noted was raised from 13s. 10d. to 17s., an increase of 22·53 per cent., which included coal and freight into works. He wondered therefore why the increase for Ireland should have been as much as 79·13 per cent. Some works were by Act compelled not to sell gas at over 4s. 6d. (with 3s. 9d. for power) per 1000 cubic feet. The Glasgow Corporation, when they advertised for tenders for 900,000 tons of coal, received offers for 25,000 tons; the reason assigned being that coal in June, 1914, was cheaper than in 1913, and so by delay the coalowners would get a higher price. In many cases, gas companies advertised for tenders without getting any response. Of 55 works, 28 received no replies; while 21 had had to purchase f.o.b. English ports—a thing which was hitherto unknown. Limerick, Tralee, Sligo, and Skibbereen had bought coal; but no one would carry it at any price. For freight from Glasgow, Sligo offered 20s. per ton, and could get no offers. What was the cause of this excessive freightage, and could it be combated? Appeal to the Board of Trade seemed to be hopeless, though the whole country knew that the freightage scandal was one of the most notorious failures of the present Government, and was due, in part, to unpreparedness. Protest after protest had been sent in; and he trusted the people would keep on protesting, until this real "injustice to Ireland" was removed. It had been suggested to him that a possible solution of the problem would be for works in particular areas to combine and secure one steamer to bring over their coal requirements. While this might certainly be possible, it had to be remembered that hardly any two gas-works in the same neighbourhood bought their coals from the same colliery; and this was where he thought the trouble would begin. Doubtless, the larger the ship the smaller would be the rate per ton; but he feared that, unless the Government were forced to render assistance, gas would remain at its present price, if they did not even have to raise it further. The reply of the Board of Trade on this question was characteristic of the attitude of that body towards many important problems of trade and commerce which at the present time confronted the country. It seemed that it was impossible for the officials of the Board to take a businesslike view of the situation. The rise in freights was traceable to two causes—the large demands made by the Government on the available tonnage, and the shortage of tonnage due to the fact that German boats were now no longer available for international carrying. The tonnage requisitioned by the Government had been proved to be very much in excess of their actual needs; and if the Government could be persuaded to exercise with regard to requisitioned ships that economy which furnished texts for so many Ministerial speeches, there would be a considerable number of ships released for commercial purposes. But even if this were done, there would still remain a substantial shortage; and, therefore, the only way in which the situation could be adequately met would be by the Government taking control of the shipping in the same manner as they had of the railways and munition factories. Instead, however, of taking the matter firmly in hand and dealing with it, the Government had referred the whole affair to several Committees, on most of which would be found interested persons. One could look forward to the recommendations of these Committees being made known within a year of the termination of the war. While to them as gas managers this question of freights was a serious one, they must not forget that it was also serious for the whole country. The rise in price of the necessities of life, due to the high freight rates, was causing a certain amount of unrest generally. It was useless for the Government to plead, as Mr. Runciman had done on a recent occasion, that through the medium of the excess profits duty they recovered a large proportion of the increased freights. The shipowner who made £20,000 increased profit would not be reduced to poverty because he had to pay 50 or even 60 per cent. of it to the Government. As a matter of fact, by transferring part of their capital abroad, it was possible for some of these companies to evade excess profit duty to such an extent as to render it a comparatively negligible item. He was therefore forced to the conclusion that State control of the shipping industry was essential to secure that necessities should be transported at freights which were not prohibitive to the industry dependent upon the imported articles.

Mr. H. Kirkham (New Ross) said, if he remembered rightly, at the time they tried to approach the Board of Trade, they were endeavouring to induce members of Parliament to press the matter. What replies were received from them?

Mr. Airth said he received replies from the three principal members for Ireland; and they all agreed to act with the Association and to introduce the deputation to Mr. Runciman, and otherwise do all they could. The member for Louth and Mr. Hazelton also replied, and stated that they would do what they could, and would go with them personally on the deputation. But, of course, there was no need to proceed further in this direction after the receipt of the letter from the Board of Trade saying they saw no need for a deputation at present.

Mr. Kirkham remarked that, so far as he could see, if they were nasty they would get something; but if they remained meek and mild they would be sat upon. The members of the Association ought to try and get the whole of the Irish representatives in Parliament to take the matter up and bullyrag the Government until they did something. There was nothing like agitation. Not only did this matter affect gas people, but it affected the whole of Ireland; and it was therefore a point of national importance

that the Irish members of every section should take up boldly with the Government.

The PRESIDENT suggested that some resolution should be passed by the meeting indicative of the course the members would like to see adopted. As Mr. Kirkham had said, it was a national question. He himself had already dealt with the matter in his Presidential Address, and so it was unnecessary for him to go into it further now. As to the composition of the Committee appointed by the Board of Trade, it would, of course, be useless for them to try and get any concessions from coal merchants who were selling an article which gas people were desirous of getting at reduced prices. At the request of the Urban District Council of Tralee, the local member had already put a question, which had been answered to the effect that the Board of Trade had the matter under consideration, and would report in due course. This took place six weeks ago; and he (the President) had heard nothing since.

Mr. T. J. REID (Ballina) said he did not think they had at all grasped the seriousness of the situation. The question for the meeting was whether the Committee of the Association had done all that they could do to find a way out of the difficulty. The matter was put before the Committee some months ago, and a certain line of action was decided upon and followed out by their able Secretary, to whom the thanks of the Association were due for the energy he had displayed and the trouble he had taken to try and bring the affair to a successful issue. He had failed, however; and the point to consider was whether anything else could be done to make the Government realize their responsibility to the country. It was really a national question; and the seriousness of the situation was not sufficiently understood by the public themselves, or by the authorities in the various towns served by gas companies. Unfortunately, in too many places where the gas concern was not municipally owned, even if there was really no direct antagonism, gas-works seemed to be looked upon by the authority as purely commercial undertakings, regardless of the fact that they discharged an important public duty. The various authorities throughout the country should be brought more into touch with the actualities of the situation, and be made aware of the necessity for providing coal, especially for the smaller concerns—the larger ones could look after themselves. The small amount of coal required for these works, as had been pointed out in the memorandum issued by the Secretary, was only something like 100,000 tons per annum, which was a mere bagatelle when compared with the quantity produced in the kingdom; and the seriousness of the situation was such that it was incumbent on the Government to provide this 100,000 tons at a reasonable price. Freight was really the important point; they had to pay double or treble the rates they used to. Besides this, the shipowners were refusing to offer tonnage for certain ports in Ireland. He himself had approached more than a dozen shipping companies to get an offer of tonnage to the west coast of Ireland. Not having been successful, he was compelled to come to Dublin, where labour relations were never of the sweetest. This simply accentuated the difficulties there, with the result that vessels were held up, demurrage had to be paid, and waggon shortage was brought about. It was piling on to Dublin what should be spread over the country; and it was not fair to the rest of the country, which was deprived of income to which it was entitled. It also increased the cost of coal and congested the railway. He did not know what was in their minds as to the resolution; but he thought the members of the Association might go to the different urban district councils and other authorities throughout the country, put before them all the facts, make them realize the difficulties, and get them to approach the members of Parliament to secure some relief.

Mr. KIRKHAM suggested that some resolution might be adopted and printed; and then the Secretary might circularize the members asking them to take up the matter vigorously. The resolution should also be submitted to the different urban councils, not only for the sake of the gas industry, but for the general good. As a matter of duty, these councils should take the question up on behalf of the general public. There were plenty of ships interned; and they could see that there were other things which might be done.

Mr. REID remarked that the Committee had already passed a resolution which he did not think could be much improved upon. If the Press would take up the matter, it would be of assistance to them. Ireland had not received justice in this connection at all. What they wanted to do was to get the Board of Trade to supply freight at a definite figure. They were all prepared to pay their fair share of the cost of the war; but now they were being mulcted. The shipowner should be like a cab-driver—he should have to go where freight was tendered. How would it be if the manager in each town saw that the resolution was brought to the notice of his council?

Mr. KIRKHAM: If you ask the gas manager to approach the urban district council, the council will say they are not going to act for the gas company. If you send the resolution out officially, it will have more effect.

The PRESIDENT: I think there is nothing more feasible than to hammer at the Board of Trade again.

Mr. T. J. DELAHUNTY (Drogheda) suggested that the resolution might also be sent to boards of guardians to take up. Gas managers were, he said, affected more, perhaps, than anybody else; but at the same time surveyors, electricians, and all works and households, down to the very poorest, were hit by this coal question, which was really a question of freight. The only way by which the Irish people would get anything would be by agitating and forcing the Government to give them what they wanted, without the aid of members of Parliament. If the resolution was sent to rural councils and boards of guardians, they would take the matter up with the urban district councils.

Mr. A. S. BROOK (Lisburn) suggested that the resolution should not refer to the gas industry alone. It was a matter which certainly had had a very serious effect indeed on industry generally in Ireland. In fact, he did not think anyone in the British Isles had suffered to the extent that they had.

Mr. REID said he did not know that they ought to appoint themselves sponsors for the rest of the industries in Ireland; and if they circularized the boards of guardians and all the other authorities, it would mean a lot of work.

Mr. AIRTH said that if the resolution finally decided upon were sent round to as many quarters as he could find time to address it to, it might have a good result. He would do what he could to distribute it; and with the help of the Committee and the incoming President, it ought to be possible to draft a resolution which could easily be adopted by the whole of the inhabitants of Ireland.

The PRESIDENT: Will you leave the matter in the hands of the Committee originally appointed to deal with it, to amend the resolution to meet the present purpose, and distribute it among the local authorities in Ireland?

Mr. W. E. YOUNG (Queenstown) moved to this effect.

Mr. KIRKHAM seconded, with the addition that, as soon as the resolution was adopted, copies were to be handed to the members.

This was agreed to.

VOTES OF THANKS.

Mr. KIRKHAM proposed a vote of thanks to the President for the way in which he had conducted the business. He had had a very hard time during the two years he had held office; and the members of the Association realized all the trouble he had taken. No occupant of the chair, he believed, had ever better earned the medal than Mr. Enright; and he hoped he would live long to wear it.

Mr. S. MOORE (Portrush) seconded the proposition, which was heartily agreed to.

The PRESIDENT, returning thanks, said it had been a pleasure to do what he could for the welfare of the Association.

Mr. W. STEEL (Athlone) proposed a vote of thanks to the Secretary for the good work he had done in connection with the coal question.

Mr. J. TAYLOR (Coleraine) seconded the resolution, which was cordially passed, and acknowledged by Mr. AIRTH.

RESOLUTION ON THE COAL QUESTION.

The following is a copy of the resolution agreed upon after the meeting:

> "That this meeting, representative of the gas industry in Ireland, views with the gravest apprehension the present condition of coal supply to Ireland, and is convinced, should this condition not be speedily relieved, many of the smaller gas-works and other industries must shut-down, with consequent loss and inconvenience to the public.
>
> "We therefore urge upon the Government the extreme and immediate necessity for adopting such measures as will assure an adequate supply of coal at reasonable prices, including sea carriage.
>
> "That a copy of this resolution be forwarded to the President of the Board of Trade, the Irish parliamentary leaders, and the public bodies and Press in Ireland.
>
> "That a Sub-Committee of three members be appointed to deal with this matter, and if necessary seek an interview with the President of the Board of Trade."

The Social Side.

In the evening, the annual dinner of the Association took place in the Dolphin Hotel, Essex Street—a party of about fifty members and friends spending a thoroughly enjoyable evening. The repast was an excellent one, and there were some apt speeches, and a good musical programme. The Loyal Toast, proposed by the President, was followed by a quartette by Mr. Norman's family. In a speech which appealed greatly to his hearers, Mr. C. S. Campbell, B.L., gave "Prosperity to the Irish Association of Gas Managers;" and the President responded to this, as he afterwards did to his own health, which was proposed by Mr. C. B. Tully. After a song by Mr. T. J. Reid, "The Visitors" was submitted by Mr. H. W. Saville, and replied to by Mr. G. Randell. Then there were conjuring and juggling by Mr. Horace Norman, and songs by Mr. A. S. Brook and Mr. L. P. Phillips. Other toasts were "The Ladies," proposed by Mr. Randell and replied to by Mr. Campbell; and the "Hon. Secretary and Auditor," submitted by Mr. Campbell, and responded to by Mr. George Airth and Mr. G. W. Norman. In addition to those already mentioned, contributions to the programme of Miss Reidy, Mr. Wilson Kelly, and Mr. Cathal M'Garvey were much appreciated.

On the following day, favoured by fine weather, there was an excursion to Drogheda, which had been carefully planned to make the best of the time at disposal. Travelling by motors *viâ* Ashbourne and Slane, the White Horse Hotel, at Drogheda, was reached about 1.30, and there dinner was served. Hereafter

various places of interest in the town were visited, among them being the Court House, where the visitors were privileged to inspect the sword, mace, and cups presented to the Corporation by William III., and a number of historic documents. The Mayor (Mr. Laurence Stanley), the Town Clerk (Mr. J. B. Connolly), and the Borough Surveyor (Mr. T. J. Delahunty) spent the day with the visitors, and explained to them all the features of interest. The Town Clerk proved himself familiar with all the details of the treasures contained in the Court House; and he pointed out the excellent Irish workmanship displayed in the mace, and the remarkable penmanship displayed in the charters granted by James II. and William III. The Mayor, in giving the visitors a hearty welcome, said he understood it was eleven years since the Association last visited the town, and he hoped it would not be so long before they came again. Before leaving the Court House, the President said that, on behalf of the Association, he wished to sincerely thank the Mayor for the honour he had done them by attending the dinner and accompanying them round the town. He also thanked the Town Clerk for all the trouble he had taken. In response, the Mayor said it had given him a great deal of pleasure to be of assistance to them; and if at any future date the Association honoured the town with their presence, he was sure the Mayor of that time would be only too glad to extend to them a cordial welcome. The Town Clerk said he hoped they would carry away pleasant recollections of the visit. Tea was taken in the hotel; and then the party returned by way of Balbriggan and Swords, to Dublin, where they separated thoroughly well pleased with the day's outing.

DOHERTY'S AMERICAN COAL CARBONIZATION PATENTS.

A series of four American patents were recently taken out [June 13 last] by Mr. H. L. Doherty, of New York, relating to a method of making combustible gas, to a method of carbonizing coal in vertical retort gas-benches for the production of gas and carbonized fuel, and to a method of conducting combustion. Pending the issue of the English specifications for these inventions, we reproduce from the "Journal of the Society of Chemical Industry" their summary of the Doherty proposals—the numbers of the United States patents, being: (A) 1,187,048, (B) 1,187,049, (C) 1,187,050, and (D) 1,187,051.

(A) A body of fuel is conveyed, at a rate greater than that of complete combustion, past an oxidizing current of such nature and in such volume that part of the fuel is converted into combustible gas. Part of this gas is circulated through the unburnt fuel, and then through the partly burnt fuel to cool the latter, and is then withdrawn with the main current of combustible gas. The coarser part of the cooled fuel is separated and mixed with a regulated portion of fresh fuel for use as above. (B) Coal, or a mixture of coal and coke, is passed through a relatively long conduit heated externally at its middle zone, and the gas is withdrawn through the fuel at the charging end, where the heavier distillation products are condensed in the fuel. Part of the gas is treated to remove illuminants, cooled, and passed through the withdrawal end of the retort to cool the coke, and then returned to the gases leaving the charging end of the retort. (C) In a retort such as that described in (B), air is supplied to the heated zone in quantity sufficient to maintain the fuel at the desired temperature. Part of the discharged coke is mixed with the fresh coal charged into the retort to maintain its porosity. (D) In a retort such as that described in (C), a portion of the gas from the combustion zone is passed through the advancing fuel to preheat it and cool the gas, and the gas is then passed through the fuel at the discharge end to cool it and heat the gas, which is then passed through the combustion zone. The rate of feeding of the fuel by gravity may be such that sufficient fuel remains unburnt to maintain the porosity of the charge in the retort.

Gas Annealing Furnaces.—A gas-furnace newly installed by the Paris firm of Ledormeux Dupont and Co. for the annealing of soft steel wire coils was described and illustrated in the "Journal des Usines à Gaz" for Aug. 5. The furnace consists of a masonry structure reinforced with external channel standards, and fitted with counterpoised doors for the introduction and removal of the coils. The furnace is heated by five atmospheric burners ranged along the length of the base. These yield a temperature of 800° C., and consume about 20 cubic metres (700 cubic feet) per hour. The furnace is continuous in action; one coil being inserted on one side and at the same time another removed by the opposite door. On this system, ten hours are required to anneal 75 coils, equivalent to 2½ kilos. of steel. The gas consumed per coil is thus 2·6 cubic metres, costing about 52 c. In comparison with the coal-furnace previously in use, it is found that the results are better, owing to the more exact regulation of the temperature, and that there is no production of brittleness from faulty heating. Moreover, the wire is found to be heated uniformly throughout its entire length. The soft steel wire of 5 mm. diameter is annealed in coils each weighing 35 kilos.

THERMAL PROBLEMS FOR GAS ENGINEERS.

VI.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

Calorific Value and Air Consumption of Hydrocarbons.

Table VIII. [p. 346] illustrates some properties of hydrocarbons that will be readily understood from the explanations previously given. The calorific or heating values set forth in columns 2 to 5 are based on the results of actual experiments with the calorimeter, as published by various authorities. It will be observed that the large consumption of oxygen or air and the high values obtained for the heavier hydrocarbons are due to the high specific gravity of their vapours, some of which are six times the weight of ordinary town gas, or forty times that of hydrogen. A better idea as to relative value is afforded by column 5, which gives the relative values per pound weight of each substance; and it is obvious that all compounds of carbon and hydrogen must have a value intermediate between those of the two elements. The principal hydrocarbon constituents of coal gas—the methane and ethylene series—have a value not far removed from 20,000 units per pound, and approximating to that usually assigned to tars, oils, and petroleums. The same will be noticed in regard to column 9, which shows the calorific values, as calculated on the proportion by weight, of hydrogen and carbon present in each substance.

Comparing 5 and 9, the observed value as a rule is less than the calculated; and the reason for this has already been stated. But the figures for acetylene and naphthalene are notable exceptions, which perhaps serve to explain the properties peculiar to those substances. With regard to these and other inconsistencies, we must remember it is difficult to obtain the heavy hydrocarbons in a state of 99 per cent. purity. Professor W. Foster mentions a sample of butylene supplied to him, which, on examination, was found to be only 84 per cent. pure. Special arrangements must be made to ensure their complete combustion. This may serve to explain the numerous inconsistencies between the results obtained by various observers when examining these substances.

The original of Table VIII. includes a large collection of photometrical and enrichment values, exhibiting such a degree of divergency that it is useless to publish them; and there is the less necessity for so doing because the tendency of the heavy hydrocarbons is at present decidedly in the direction of the tar-well. Up to August, 1914, the usual practice was to retain them in the gas. For well-known reasons, this policy was then reversed, and is not likely to be again resumed. The matter is therefore now of little practical importance. Columns 6 and 7 show the volumes of air or oxygen required by one volume of the substance to ensure complete combustion, which in the case of all hydrocarbons means complete oxidation to water and carbonic acid. From these, some interesting conclusions may be drawn as to the value of heavy hydrocarbons for use in burners of the Bunsen type. Column 8 is a ratio obtained by dividing 6 into 3. The simpler the compound, and the nearer the approach to the elementary state, the greater the calorific value per unit of oxygen consumed. Each class of hydrocarbon exhibits some degree of sequence in respect to oxygen consumption, and in the case of the methane, ethylene, and benzene series, an advance at the rate of 1½ volumes for each consecutive member. Column 8 indicates that the ratio, except with acetylene and naphthalene, is fairly regular and in the neighbourhood of a little over 500, and decreases slightly as we advance upwards from the lowest member of each series. Starting with methane at 518, we gradually reach heptane with 504.

The constitution of the ethylene series of hydrocarbons is such that the proportion of each constituent in any member is the same—six parts of carbon to one of hydrogen. The calculated value (9) is therefore common to all; but the observed values (5) follow the slight decrease above mentioned.

Column 10 of the table shows a few photometrical values which suggest the possibility of some regular sequence in respect to illuminating values. Column 8 is useful as a check in calorimetrical experiments, and also as affording a method for estimating the value of other members of the series that do not appear in the table, and possibly it may in some instances approach as closely to the truth as the calorimeter tests.

Science and Engineering.

Having reviewed the principal data available in respect to operations in which thermo chemistry is concerned, we proceed to consider some actual applications of the same in connection with the gas industry. It is obvious that the minimum quantity of heat on which any particular process can be conducted will be that actually absorbed or used up by the work in hand. If the object is to convert water at 60° Fahr. into steam at 100 lbs. pressure per square inch, we cannot by any means secure this result on a supply of less than 11,539 B.Th.U. per gallon of water evaporated. In practice, the consumption will be more. Some amount of loss by radiation and convection from the exterior of the boiler setting and the products of combustion escaping at the top of the chimney is unavoidable; but the same can be reduced to a minimum by appropriate and skilful designing, and by the employment of a competent furnace man. When the scientist has supplied the data for the estimation of such sources of waste, it is the province of the engineer to design and construct apparatus in such manner as to reduce the waste to the lowest possible limit, and to produce

TABLE VIII.—*Calorific Value, Consumption of Oxygen and Air, &c., of various Hydrocarbons.*

(1)	(2) B.Th U. Per C Ft. 60°, 30 in. Moist.	(3) B Th U. Per C. Ft. 60°, 30 in. Dry.	(4) B.Th U. Per C. Ft. 32°, 30 in. Dry.	(5) B.Th U. Per Lb. 60°, 30 in. Moist.	(6) Oxygen Consumed, by 1 Vol.	(7) Air Consumed, by 1 Vol.	(8) Ratio. (3) ÷ (6).	(9) B.Th.U. Per Lb. (calculated).	(10) Illuminating Power. 5 Cubic Feet.
Hydrogen	321	328	348	61,885	0·5	2·38	656	..	..
Carbon (vapour)	..	..	..	14,650	..	..	..	..	..
Carbon monoxide	321	328	348	4,421	0·5	2·38	656	..	..
Methane	1017	1036	1099	24,169	2·0	9·52	518	26,459	5·0
Ethane	1781	1814	1925	22,351	3 5	16·66	518	24,097	35·0
Propane	2511	2557	2713	21,469	5·0	23·80	511	23,238	54·0
Butane	3229	3288	3489	20,182	6·5	30 94	506	22,794	..
Pentane	4040	4115	4366	20,362	8·0	38·08	505	22,522	..
Hexane	4703	4772	5063	19,470	9·5	45 22	503	22,339	..
Heptane	5445	5545	5883	20,092	11·0	52·36	504	22,207	..
Ethylene	1625	1655	1756	21,872	3·0	14·28	552	21,398	68·5
Propylene	2379	2423	2571	21,221	4·5	21·42	538	21,398	..
Butylene	3049	3105	3294	20,367	6·0	28·56	517	21,398	123·0
Amylene	3776	3844	4078	20,202	7 5	35·70	519	21,398	..
Acetylene	1505	1532	1625	22,853	2·5	11·90	613	18,000	..
Naphthalene	4536	4620	4902	13,290	12·0	57 12	385	17,600	933
Benzene	3791	3869	4105	17,818	7·5	35 70	516	18,203	..
Toluene	4457	4550	4828	17,739	9·0	42 84	510	18,758	..

100 lbs. pressure steam with as near an approach to the 11,539 B.Th.U. limit as practical considerations of cost and durability of material will permit.

As regards destructive distillation of coal or gasification of coke, we shall see that the actual net working consumption of heat is comparatively small—certainly less than that absorbed in raising steam—and that the bulk of the heat generated in the furnace is dissipated in directions that are to some extent under the control of the engineer. Investigations in this respect are difficult and complicated, seeing that such losses are largely influenced by individual peculiarities dependent on the design and environment of each particular furnace to such an extent that there is difficulty in arriving at general conclusions common to all.

(*To be continued.*)

COMBINED STEAM AND GAS ENGINES.

A Six-Thousand Horse Power Installation.

[FROM THE "ENGINEER," AUG. 4.]

Power generating equipment of a very novel and remarkable character has been adopted for the large automobile works of the Ford Motor Company at Detroit. It comprises electric generators driven by a combination of gas and steam engines, with boilers and gas-producers, and regenerators to utilize the waste heat.

There will be six main units, each with a capacity of 6000 H.P. at a speed of 80 revolutions per minute. The arrangement resembles that of a horizontal twin tandem-compound steam-engine unit; but one side consists of a two-cylinder tandem gas-engine, and the other side consists of a two-cylinder tandem compound steam-engine. The engines are connected to opposite ends of a shaft, upon which is mounted a generator of 4000 kilowatts for 250-volt continuous current.

The gas-engines have water-cooled cylinders, 42-inch by 72-inch, and are of the four-cycle double-acting type. The gas exhaust is utilized in a steam superheater on the steam-main between the high-pressure and low-pressure cylinders of the steam-engine. A portion of the exhaust gas is passed through the jacket of the high-pressure cylinder in order to reduce heat loss. Finally, the exhaust gases are utilized in the feed-water heaters for the boilers. This water has already been passed through the cylinder jackets of the gas-engine, and has thus been heated to about 160° or 180° Fahr. before it enters the heater, in which the exhaust gas raises the temperature to about 250° for the feed.

Producer gas may be passed through some of the boilers on its way to the scrubber. This gas, being at relatively low temperature, will not serve for forcing the boilers; but provision is made for burning some of the gas in the furnaces when it is necessary to work the boilers at full capacity.

All the valves, which are of the mushroom type, are arranged in pockets in the bottom of the cylinder, and the valve gear is beneath the engine-room floor, or in the basement. The layshafts are driven from the main shaft by bronze worm gear. Each layshaft carries four cranks, one for each end of each of the two cylinders; and each crank operates both the inlet and exhaust valves. The governing is done through the shifting of a cam, which trips the admission valve. This valve is closed by a spring, and cushioned by a dashpot, as in a Corliss steam-engine. The governor shifts the position of the cams by means of an eccentric on its shaft.

The pistons are cooled by water circulation. A pipe, attached to the intermediate crosshead between the cylinders, connects with an inner tube in the hollow piston-rod. The water passes through this pipe, and returns through the annular space between the pipe and the wall of the piston-rod. The connecting water-pipe is telescopic, and is in an inclined position, with one end attached to the crosshead and the other pivoted to a stand on the engine-room floor. Thus the pipe oscillates and telescopes with the travel of the crosshead.

The steam-engine of each unit has tandem cylinders 36-inch by 72-inch and 68-inch by 72-inch. Poppet valves are used on the high-pressure and Corliss valves on the low-pressure cylinder. This latter cylinder is connected to a surface condenser arranged in a closed heating system; and the vacuum will be regulated in accordance with variations in the atmospheric temperature. During the winter the vacuum will be maintained at about 18 inches, and the circulating water will be pumped through the heating pipes and radiators in the various factory buildings. The steam will be superheated, and will be delivered to the engines at 175 lbs. pressure.

The gas-steam unit is designed to combine the economy of a gas-engine under constant load with the reliability of a steam-engine under varying load. A gas-engine operates to best advantage, as a rule, under full load and constant load; but under such conditions there is practically no overload capacity. The general practice, therefore, is to run the engine rather underloaded. This produces wire-drawing of the gas through the valves and ports, which tends to cause precipitation of tarry matter. Such trouble does not occur with the engine running under full load. With the combination gas-steam unit, the gas-engine does not come into service until there is at least something more than half-load on the unit; so that this engine will be normally under full load. The steam-engine does all the governing, and can meet fluctuations in the load. The only governing on the gas-engine is to prevent any excessive speed. In case of trouble with the gas side of the unit, the steam side can handle the full load by giving a late cut-off.

The electric generator of each unit weighs 105 tons, and has an armature 16 feet in diameter, weighing 45 tons. The field frame is 21 feet high and 26 feet wide across the projecting feet which support it upon its foundations.

Considerable trouble has been experienced in completing and adjusting the units so that they will operate in service in the manner designed. There has been trouble also with the gas-producer plant. Taken altogether there appears to be some scepticism among American engineers as to the economical and efficient operation of the combination units—more especially as to the reliability and freedom from operating troubles which is such a desideratum for the power equipment of manufacturing establishments. The first units were installed by the end of 1915; and it was hoped to have the entire installation completed some time in the summer of this year. It will be interesting to hear how the engines work.

Amalgamation in the German Illuminating Industry.—One of the "German News" paragraphs in last Saturday week's "Ironmonger" was this: The Syndicate for Illuminating Goods has been merged into the Association of Manufacturers of Illuminating Goods. The first outcome of the amalgamation was a sudden further increase in the price of all illuminating bodies of 40 per cent.

Coal Production in the United States.—According to the American Geological Survey, the production of bituminous coal and anthracite in the United States in 1915 amounted to 531,619,487 short tons, valued at $686,691,186, an increase, compared with 1914, of 18,094,010 tons in quantity and of $5,200,543 in value. Of this output, 442,624,426 tons, valued at $502,037,688, was bituminous coal and lignite, and 88,995,061 tons, valued at $184,653,498, was Pennsylvania anthracite. Pennsylvania, with an output of 157,955,137 tons of bituminous coal and 88,995,061 tons of anthracite, ranks first among the coal-producing States.

SMALL GAS-WORKS ECONOMIES:

MECHANICAL, CHEMICAL, CLERICAL.

By S. Moore, of Portrush.

[**Extracts from a Paper read before the Irish Association of Gas Managers, Aug. 15.**]

It is hoped the small beginnings in this paper may lead to larger endings, resulting from helpful discussion. Constructive criticism is therefore heartily invited. Please do not withhold your contribution on the topic. What is old knowledge to you may be new information to somebody else. Here are brief particulars of some difficulties and how they were overcome.

Mechanical.

"Live-Beat" Pressure Gauge.—A useful and reliable pressure indicator for the retort-house was made principally from an old 2-light dry meter as follows: One of the diaphragms, attached intact to the division plate, was first carefully removed from the meter, next proved to be gastight, and then a short piece of ½-inch brass-tube with a suitable stop-cock was soldered into the vent-hole. This pulsator was fixed to the bottom of a round tin box, 8½ inches by 4 inches, with the movable metal disc of the diaphragm upwards, and a wire rod, soldered to the centre of the disc, running up through a small hole in the lid of the box. The top end of the rod was shaped in the form of a pointer, and a figured scale, placed behind this vertical rod, completed the apparatus. When the pulsator was connected to a small pipe from the foul main, the pointer moved up and down in front of the scale, indicating the pressure or the vacuum.

This very simple pressure indicator proved much more suitable for a warm retort-house than the old type liquid gauge, as the latter is liable to become inaccurate owing to evaporation, and usually requires frequent cleaning and adjustment. Another advantage with the home-made indicator is the possibility of having a large easily-read scale, which is a very great convenience. As a useful addition, if desired, the terminals from an electric bell set can be connected to the indicator, and when the pointer reaches (say) 1¼ inches, either vacuum or pressure, as the case may be, it comes in contact with one of the terminal wires, thus completing an electrical circuit, and causing the bell to ring.

Stopped Ascension Pipes.—The causes of, and the remedies for, stopped ascension pipes are fairly numerous. Generally speaking, the chief causes are high heats, light (and long) charges, pressure caused by the hydraulic main, and undue proximity to hot front walls of a setting. In addition to the obvious remedies or preventative measures which these causes suggest, one engineer recommends lengthening the ascension pipe, another advocates putting half-a-shovelful of powdered lime into the retort along with the charge of coal, and yet another finds nothing to equal a steady drip drip of water within the ascension pipe. All agree that the use of a bent auger should never be omitted.

In the country works we are now supposed to be visiting, a top retort used to be particularly troublesome, but the difficulty was entirely overcome by suspending a length of old ½-inch iron tube inside the ascension-pipe, reaching from about 9 inches above the mouthpiece up to the bridge-pipe connection; the suggestion being that the small pipe provides a ready means for some of the tar to return to the mouth of the retort and not be turned into pitch on the hot inner walls of the ascension pipe.

Standard Quality Gas.—Have you ever come down early some morning in your busiest season to find the "night-shift" was asleep and the exhauster "pulling" everything into the holders except good quality gas? Have you ever heard of a country town where the gas is seldom of the same quality for any two weeks in succession? These conditions were quite commonplace at one time in our typical (?) works; but a considerable improvement was effected when the gas supply to the ignition tube of the gas-engine (driving the exhauster) was taken from the inlet instead of the outlet of the gasholder. This arrangement ensured that "bad" gas always stopped the engine, putting an end for the time being to the possibility of any "blue" quality gas reaching the town. This idea, however, did not fulfil all the requirements as regards a "standard" quality of gas. Therefore the following simple mechanical arrangement was devised, and proved highly satisfactory.

The old-fashioned exhauster governor was detached, and a simple "flap" bye-pass valve (made of sheet metal) was inserted in place of the governor valve. A pulsator, made from an old gas-engine gas-bag, was next securely fixed to the ceiling above the speed regulating governor of the gas-engine, and thence connected by a ½-inch pipe with the foul main. A simple device for adjusting the desired "pull" and a flexible wire attachment (with suitable springs) from the pulsator to the engine governor completed the apparatus. This pulsator arrangement automatically speeds the gas-engine or slows it, according to the quantity of gas being made at any time throughout the whole twenty-four hours of every day. An unvarying quality of gas is thus assured, without the frequent changing of weights so necessary with an exhauster governor.

This automatic regulator gives best results where there is no exhauster governor; but even with the governor in use the regulator is a decided advantage.

Chemical.

Waste Products.—Very few of us ever have full opportunity for investigating the higher branches of chemistry as applied to the complete working-up of gas-works bye-products. We simply look at a bucket of tar and wonder at the hidden marvels contained therein. But no lack of expensive plant or special training need keep us from investigating the gas-works waste heap lying at our very doors. Here, indeed, is a field ripe for exploration and development; and if the saying be true that money saved is money earned, then it may be possible, metaphorically, to turn the waste products of the gas-works into shining, glittering gold. Here, for instance, is a list of some of the "little things" that can be produced mainly, and in some cases entirely, from so-called gas-works rubbish: Artificial fuel, dubbin for razor strops, grindstones, knife cleaners, metal polishers, paints, pencils, paving blocks, pipe-jointing composition, stove polish, valve grinding compound, &c. Take a few examples.

"Secure" Pipe-Jointing Composition.—Retort carbon, very finely powdered, and then mixed with boiled linseed oil to the desired consistency. This is non-poisonous, and has other properties which render it far superior to red (or white) lead for jointing purposes.

"Graphite" Oil Paint.—Thin the jointing compound with boiled oil and turpentine, and add patent dryers.

"Brown Oxide" Paint.—Sift, and grind to a very fine powder, the flue dust generally known on the gas-works as "Crocus." Mix this powder with three parts of double-boiled Baltic linseed oil to one part of cheap oak varnish. Then add a small quantity of patent dryers.

"Anti-Corrosive" Brown Paint.—Melt 4 lbs. resin in a suitable vessel over a gentle heat; then move the vessel away from the fire or any naked light. Cool the resin a little; then add slowly 1 gallon of coal-tar naphtha, stirring the mixture in one direction continuously until thoroughly blended. Add 1 pint of boiled linseed oil to prevent brittleness. The preparation is then mixed while warm with very fine "Crocus" powder which has been previously blended in a small quantity of cheap oak varnish. In a very tidy little gas-works in the North of Ireland, all the woodwork and ironwork are excellently finished with paints made on the premises from gas-works waste (?) products.

"Mirror" Liquid Metal Polish.—Mix weak gas liquor (free from tar) with finely-ground flue "Crocus." If desired, add whiting or rottenstone and a few drops of cheap perfume. In a northern gas-works, all the old stoves are renewed with stove polish made on the works, and the bright steel, brasswork, tinware, and enamelled goods are cleaned and brightened with polishes made from waste products on the works.

"X.L." Grinding Composition.—Put a quantity of the flue "Crocus" through a flour sifter, and to about three parts sifted "Crocus" add 1 part of carborundum powder. Mix the lot into a paste with cheap castor oil. This compound not only grinds valves, stop-cocks, &c., effectually, but it also produces a polished "skin" on the surface of the metal which, in the case of gas-engine and motor valves, largely prevents incrustation—thereby lessening the need for grinding. The full benefit of this compound is not apparent till it has been used a few times on the same valve.

Clerical.

Concurrent with our efforts to secure a larger measure of economy and efficiency in the more technical branches of our work is the desire for improved business methods and better concentration and co-ordination of the book-keeping system. For instance, the increasing tendency to adopt differential prices for gas (or differential discounts as the case may be) brings with it greater liability to errors in the furnishing of consumers' accounts. This class of error can be almost entirely prevented by using a series of coloured inspection cards in place of the usual meter survey book. A differently coloured card represents each different rate of charge, and when entering indices on the card, or when making up the account, any change of colour at once signals a message to the brain: "Note change of rate."

The card survey system has other important advantages over the survey book:

1.—Handier to carry on district.
2.—Can always be placed in proper rotation.
3.—A card is easily replaced if it gets soiled or filled up.
4.—All "dead" cards can be filed separately, and kept for reference.
5.—The reverse side of the card may be used for notes recording all necessary particulars of meters, stoves, fittings, &c., installed.
6.—The cards are very much cheaper than books, for the same amount of work.

The consumers' ledger is another book that is often needlessly complicated and troublesome. A specimen folio is submitted, of a ledger which needs general re-writing only once a year, and provides columns for dates, indices, two different rates, meter and stove rent, arrears, payments, and sundries.

DISCUSSION.

The President (Mr. J. E. Enright, of Tralee) said he was sure they had all heard the paper read with interest; and undoubtedly there had been some novel and ingenious matters introduced. Some of what the author said, however, was not altogether new; for he himself had known it as a boy. One or two points in

particular struck him. The first was with reference to the old-fashioned exhauster governor, which was detached and a simple flap bye-pass valve inserted instead. Mr. Moore claimed that, with the device he described, under no circumstances, no matter what might occur, except if coal of a different quality were used, an unvarying quality of gas was assured. This was rather vague, because the quality of the gas depended on more than the quality of the coal. For one thing, it depended on the time and method of charging the retorts. So a little further explanation on this point might be welcome. With reference to the chemical portion and finely-ground flue "Crocus," he had had some experience as a boy with old metal retorts; and he found that the dust which was now obtained from cleaning the flues was nothing in comparison with the red dust which came from the old metal retorts. This was really oxide of iron; and everyone knew that brass work was polished with it. On the clerical side, the author spoke of the card system. The cards put before them might be simple and allow of all the latitude claimed for them; but until now paper had been very cheap, and in writing-up a ledger, it was not very difficult to leave a few lines for any street where there was a chance of getting further consumers. Speaking of the ordinary towns in Ireland at the present day, he thought they had nearly all the consumers they could secure. Mr. Moore had given them something to think about in the way of the paints he was able to make for holders, &c., and the difference in cost he had suggested. But he (the speaker) was afraid he had not added the value of the time occupied in doing the different things; and then they had to consider whether the articles would be as good as those which expert manufacturers were making for these particular purposes.

Mr. J. Woods (Banbridge) remarked that he thought the best thing Mr. Moore could do if his gasholders wanted painting, was to put the job in the hands of a prominent firm of paint manufacturers. Things he had mentioned took them away from gas manufacture and distribution altogether. They did not want to go into gas economies of this nature. He (Mr. Woods) thought he might say with safety that his own was the smallest gas-works in the world using exclusively vertical retorts; and, though he had met with disadvantages, he was left in the position that, at the end of the year, with gas at the same price and coal at a higher price, there was £515 of profit on £5000 of capital. New plant like his and that described by the President required some years to fully prove.

Mr. T. J. Reid (Ballina) said he had not intended to criticize the paper; but as he had been called upon, he would make a few remarks on it. As he understood Mr. Wood's argument, he meant that Mr. Moore might have better used his time than by engaging in these small economies, if he had devoted it to something which would show on the balance-sheet. With this he (the speaker) entirely agreed. After all, economy should show itself in the balance-sheet; and he could not see, after having read the paper over carefully and listened to Mr. Moore, whether these economies could show any result in the balance-sheet. However, he would not like to discourage the author in his researches into flue dust and other things of that sort; and he was to be congratulated upon bringing the outcome of his investigations before the present meeting. As to the live-heat pressure gauge described. From an examination of the specification of the apparatus, one would not have thought it would be so delicate in its action as a liquid pressure-gauge—being made, as it was, of two gas-meter diaphragms soldered together. However, the author had found it satisfactory; and after fuller explanation from him, some of them might adopt it in their works. Another adaptation described which had rather interested him was the method of governing the exhauster from the gas-engine. He himself had always thought there were objections to tampering with the speed of a gas-engine—that there was a certain economical speed at which it should run, and that difficulties resulted from altering it. He was also rather surprised to learn that the necessary degree of vacuum could be secured by the alteration of the engine speed. He would have thought that the relation of engine speed to exhauster speed was such that any alteration in the engine would have such an effect on the exhauster speed that the difference of vaccum would be so great as not to give a steady gauge, which they all considered so desirable. The President had referred to the fact that it was not merely a constant vacuum which it was desired to attain. This alone did not meet the requirements of good exhauster work, because many gas-works—especially small ones—charged all their retorts at one time, and therefore could work at a greater vacuum during the earlier period after charging. A constant vacuum, he should have thought, could have been attained, with any ordinary exhauster, without altering the speed of the engine. He himself had no difficulty whatever in maintaining the same vacuum, whether the charges were new or worked off. Therefore the object that Mr. Moore had been trying to attain could be effected without any of the elaborate apparatus which he had been so ingenious in devising. They all recognized now that it was necessary to preserve a standard quality of gas day after day, and every hour of the day. The author's first attempt to attain this was to connect the inlet of his holder with the ignition tube of the gas-engine. This had been tried elsewhere, and, as in Mr. Moore's case, had been found wanting. It was a very crude method of securing the object, because, if the manner of charging he had mentioned was in vogue, it followed that at the latter end of the charge the gas in the ignition tube would be such that the engine would stop while there was still some gas to be pulled off. What did Mr. Moore do to get over this difficulty? Then as to the waste products. He complimented Mr. Moore upon delving into scrap-heaps and such places; but he would have thought his desire for research might have found a better field; and he would suggest that if he had devoted his energies and his time in more fruitful directions as regarded profit, it would possibly have had more tangible results, because the material they had to work on in the shape of dust from flues, and things of this kind, was not present in sufficient quantities to warrant any great amount of trouble being spent upon it. The experiments he had made were very interesting, and might be followed to a small extent; but he did not think they would really make any material difference in the balance-sheet, which was, after all, the object they had in view in running their gas concerns. With reference to stopped ascension-pipes, he was rather interested to hear about the author's cure for these. It was one that was new to him personally. They had all from time to time had trouble from stopped ascension-pipes; and they had all adopted some more or less mysterious methods for clearing them. But never had he heard of the author's plan. He thought, in fact, that it was more or less a coincidence that in his case stopped pipes ceased with this treatment; but it had been found satisfactory, which was the main thing. They had all adopted the old method of putting a good lump of coal on the mouthpiece when troubled; and he had himself found this satisfactory. Members would doubtless be able to recall other old and reliable plans for curing the same trouble. The pipe-jointing composition suggestion was interesting; and he would try it himself. He would have thought that the addition of powder, and so forth, to the author's paints was so much matter out of place. In other words, the paint would have been just as good if the powder had not been added at all. He could not see what protective qualities the powder would have in the paint. The liquid metal polish was also new to him, so far as concerned its mixture with ammoniacal liquor; and the addition of perfume was an artistic touch which one would scarcely expect to come out of a gas-works. As to the grinding composition, he was rather astonished to hear the author explain that it was necessary for him to grind the valves of his engine once a week. There must be something wrong with the gas or the engine, because no self-respecting engine would require this grinding. If the valve was of nickel steel, or some such composition, it would not need grinding once a week, or even once a month. If the valves were polished to begin with, they should not lose it. As to the card system, if the author had adopted a loose-leaf book, it would have achieved the same result, with probably other advantages which the cards did not possess. Certainly, one could carry a greater number of pages in the case of cards. He had not made these remarks in any vein of adverse criticism. Papers like this were worthy of being brought before the Association.

Mr. W. E. Young (Queenstown) remarked that, as Mr. Reid had mentioned, it was rather a novel cure for stopped pipes to suspend a pipe inside the ascension-pipe to keep it from choking. At a works where he was some years ago, he had a mysterious stoppage of the ascension-pipes, which he could not at all understand, because the heats were the same, and the coal was the same. But still the pipes were stopping so badly that at length he actually had to have water dripping down the outside of the pipes to keep them cool. On further consideration, he suddenly remembered that the time when he first had trouble with the pipes coincided with the closing-up of a doorway in the retort-house. It had been an open doorway; but for the purpose of stacking coal, it had been closed; and this was the cause of the stopped pipes. The temperature in the retort-house was somewhat warmer than before. He opened the door again, and the trouble then disappeared. Something of this sort might have been the cause of Mr. Moore's stopped pipes. They had been greatly interested in the use the author made of waste products; but he (the speaker) would like to feel sure that they had had a proper and lengthy trial before being recommended. They could not, as managers of small works, afford to experiment. If they put this stuff on the holders and it did not last, the experiment would be an expensive one. There was much in the paper that was worthy of careful consideration.

Mr. A. S. Brook (Lisburn) said he could assure people who wanted to have some comfort at night in a small gas-works, that the apparatus described by the author for gas-engines was quite satisfactory. The point raised by Mr. Reid as to the efficiency of the gas-engine was a secondary consideration—or it would be to himself—to getting out of bed. With this particular apparatus, which he knew was in operation at four different works—he had seen it at three of them—there need be no fear as to its efficiency. Mr. Moore was to be congratulated in another respect on the way in which his mind ran. It was evident to anyone that, working in this way, he must follow gas-making as a hobby, as well as from the monetary point of view. He was deserving of every credit for what he had done. As to the question of the meter inspection book, he himself used a loose-leaf ledger. Any leaf could be taken out, and any others could be added. When a new man was put on, he could be given a book with which he could not possibly go wrong. Mr. Moore's paper would be read by many managers of small works, and would be of great benefit to them.

Mr. Reid asked whether Mr. Moore had ever used tar as a painting material on his works. It was, he said, rather neglected by some of them; but it was an excellent painting material There were works of great magnitude in England where nothing

but tar was used for gasholder painting; and he did not see why others, in studying economy, should not adopt it.

Mr. WHIMSTER: Have you ever tried to get red paint to stick on black?

Mr. REID: No.

Mr. WHIMSTER: The point is that if in hard times you have to resort to tar, in good times you cannot put any other colour on.

The PRESIDENT said the author had referred to a consumers' ledger which needed general re-writing once a year. He himself had been using a book for something like twelve years. One writing of the name did. In small towns, there might be nine or ten houses in a street using gas, and one that did not happen to do so. Well, a line or two would be left, in case they captured him. As to the use of the flap bye-pass valve in place of the governor valve, he (the speaker) had tried various kinds of valves; but for some years now he had employed a retort-house governor, and he had found nothing like it. He did not care what the pull was; it did not affect the quality of the gas at all.

Mr. MOORE, in the course of his reply to the remarks made in the discussion, said that perhaps with regard to the flap-valve he had not given quite sufficient explanation of what he meant; but he had tried to make his paper short. The old-fashioned exhauster governor they previously had was really worn out; and he must remind the members that the question that was under discussion was gas-works economies from the point of view of the small place, where it was difficult to get anything new at all. Economy was the crying need—often even before efficiency. The governor was giving trouble; and it was a question whether they should get a new governor for the exhauster or provide a substitute at no cost. The pulsator was a substitute for the governor, and from this point of view it did affect the £ s. d. of the small gas-works. He thought he would be able to meet the remarks that had been made in regard to the hours of charging, as well as those made from the economical standpoint. Prior to putting up the apparatus, they had two stokers—night and day men; but after fixing it at Dromore, he needed only one stoker in the summer time. The night stoker was given 5s. more, and he did another run of charges before he went off. The retorts were all filled up; and as the make gradually fell off, the engine reduced its speed. When the make ceased, the engine stopped working; and therefore there was no anxiety as to air being pulled in. Of course, a retort-house governor was a thing he longed for; but he was in the position of not having any prospect of getting such a thing. Mr. Woods had spoken of the necessity for a sufficiently long trial of the things mentioned. Well, he could give one concrete example of the durability of the painting. The gasholder columns and woodwork about a certain gas-works had over two years ago been painted with the material mentioned in the paper; and it was almost as fresh looking to-day as when it went on. By all means, let them have purchased paint if they could afford it. He might say that the columns alluded to were of cast iron. As regarded applying boiled oil, and getting the same results as far as preserving powers were concerned, this might be granted; but one did require a little colour at times to make the works tidy and attractive looking. They wanted to give the works an attractive appearance; and when the material had stood the heat of the retort-flues, there need be very little fear of the sun bleaching it. He had experimented with tar, and had got good results from it, with all the ammonia taken out. To anyone who desired it, he could, he believed, give a recipe for a paint that would go over tar. As to the pipe-jointing composition, at the best they could not get more than 30s. per ton for their retort carbon; and he was offered £29 per ton—which he refused—for it. Then in regard to the valve grinding, he would admit at once the engine was not a good one; but it was there, with its defects, which had to be surmounted. Others might have a similar experience, and it was well to know that they could get something to help them over the difficulty. If an engine would run twelve months without grinding on some of the ordinary materials, and one could so arrange matters that it would go twelve times twelve months, it would be so much to the good. Therefore there was something to be claimed for the grinding compound. He did not put the matter of the ascension-pipe cure forward as a recommendation for others. He had his doubts as to its acting well in all circumstances. The hint was, however, thrown out, as it might be worth the while of anyone suffering in the same way to make the experiment. Under the varying conditions of summer and winter, he had not had any further difficulty; and he had applied it elsewhere with the same results. But this might be just a coincidence. He had not found it a failure in any works in which he had used it. The loose-leaf system of books he had tried, and his experience was very satisfactory indeed; but a little difficulty he had found was that sometimes a leaf got torn out. Again, the reverse side of the loose leaf was generally used for another customer; but the card could be made a historical record of value. Especially where there was competition, one needed to have a personal knowledge of every individual customer, so as to know what was the possibility of getting in to work up as big a consumption as they could get for any service-pipe. In the matter of reference, cards could be turned up much more readily. Though some undertakings might not need much space for new customers, experience had been different in the North. In three works where he had been engaged, one of the difficulties that had frequently to be contended with was the number of applications for gas. His trouble was to keep up with the supplies without necessitating extensions of plant. The card system was particularly useful where there was a growing community of gas consumers. He had applied the "Graphite" paint to steel sheets experimentally; and so far, after being on about ten months, there was not the slightest sign of anything unsatisfactory.

BYE-PRODUCTS RECOVERED IN THE MANUFACTURE OF COKE.

By WILLIAM H. CHILDS, President of the Barrett Company, New York.

[Extracts from a Paper read before the American Iron and Steel Institute, May 26.]

We are told that in the year 1771 a chemist named Stauf, who lived in the forest near Saarbrucken, Germany, treated bituminous coal in ovens on a hill over a burning mine and obtained oil, pitch, coke, soot, and even a lump of sal-ammoniac. The great German writer and thinker, Goethe, paid a visit to Stauf there and bestowed on him the title of "Coal Philosopher." Stauf seems to have been the first to recover bye-products from coal; but the title of "Kohlenphilosoph" and a place in history was about all he got in return.

The bye-product industry has progressed since his day. We are not content with his limited list of products, nor with his modest compensation. I have not heard that any bye-product oven operator has received the title "Coal Philosopher;" but to judge from the number of new bye-product ovens now being built, returns are evidently sufficiently encouraging.

The relative quantities of the bye-products from metallurgical coke cannot be varied to any extent; and in most cases the demand for coke, the main product, absolutely governs the output of the others. Continuous operation is essential to profits; hence a continuous market for the bye-products as well as the main product must be secured. Where these requisites have been overlooked or minimized, embarrassment or disaster has not been slow to follow. The recognition of these difficulties is one of the chief reasons for the seemingly slow progress the bye-product oven has made in this and in other countries.

DEVELOPMENT NOT UNIFORM HERE AND ABROAD.

As we are all aware, the English and German development of coal bye-products began earlier than in this country, and hence has progressed further. In England, the growth and extension of the coal-gas works put sufficient quantities of coal bye-products on the market to bring about commercial exploitation of their simpler derivatives before it was done elsewhere. In Germany, however, the commercial development, as distinct from that of theoretical chemistry, has waited on the growth of the bye-product coke-ovens. Germany came into the field later than England; but her broad and persistent methods of research, and their application, have carried her ahead in many lines—particularly those generally included under the title of coal-tar chemistry.

In the United States the industry may be said to have waited for its larger development on the advent of the bye-product coke-oven. Coal-gas plants were established and operated in the United States, and the primary bye-products were recovered and worked-up; but the quantities were relatively small, and the business was carried on in a number of isolated establishments. Extension was hindered by the long distances between the several points of production and between them and the prospective markets. Moreover, carburetted water gas was very popular and cheap, and for many years promised a larger development than coal gas. With the bye-product coke-oven came the carbonization of large quantities of coal at one plant, corresponding quantities of bye-products, and a basis for an industry.

The development of this industry in the different countries has proceeded in general along the lines of least resistance and of greatest opportunity. The results have not been identical by any means. In Germany, for instance, certain conditions favoured the development of the higher coal-tar chemistry; and in this direction a detailed, laborious, and highly scientific structure was built up. On the other hand, practically all the pitch made in Germany (or indeed in Europe) is intended for fuel purposes, whereas in the United States the use of the softer grades of pitch have been carefully developed. A further illustration of this is in the use of gas. In the United States, coke-oven gas has been used for general city purposes since 1899 with success and increasing favour. In spite of her extensive bye-product coke-oven industry, Germany did not do this until 1910, but laid great emphasis on the use of oven gas in gas-engines for electric power development. In this direction, the United States has remained behind. Many other such points of difference might be cited.

It should be recognized in this connection that for some years past practically all the coke made in Germany has been with bye-product recovery. Aside from the normal expansion of the iron industry and the additional coke capacity needed for it, or an extended use of coke for general fuel purposes, made possible by present war measures, the German bye-product recovery has reached its maximum. No large increments of tar and ammonia have been expected from this source for some time. This fact has doubtless played an important part in the German progress toward more refined chemical products. In England, this condition is approached; but in the United States matters

are very different. Based on the maximum Government figures for 1912-13, the coal carbonization for coke and gas was about 73 million tons. Of this, only 19 million tons, or 29 per cent., was with bye-product recovery. In other words, it is possible for the present bye-product recovery to be increased three-fold without figuring on any increased iron and steel production.

That this prospect is by no means an idle vision is testified to by plans now on foot in the construction of bye-product ovens. At present, new ovens to the number of 2600 are under contract, and will probably be completed by the end of 1917, and others are in prospect. The bearing of this fact on the future position of the bye-product market is a matter that must be reckoned with in due course.

From the point of view of those who rate highly the ability of the country to maintain itself in war or in peace, the development of our resources in this direction is a cause for congratulation. Germany and England have both found their coal bye-product industries of vital importance to them in the present crisis—not only because they are essential to the steel industry, but also because they are the great source of benzol, toluol, phenol, and other chemicals used in the manufacture of explosives. Not only this, but in our case they are the only operating native source of combined nitrogen, from which nitric acid (so absolutely necessary in making explosives) can be made. The only alternatives are the roundabout and costly method of atmospheric nitrogen fixation, or the importation of Chilian nitrate, the last of which might be cut off in time of war. These facts are but little known to the general public or apparently to members of Congress.

As the title of this paper covers specifically the bye-products of coke making, I shall not devote any space to coke—more particularly as I would be speaking as an outsider to an audience largely composed of specialists in that line.

In order to deal with the subject systematically, it will be necessary for me to take up the various primary bye-products by themselves—these being in order: Ammonia, gas, benzol, cyanogen, and tar.

Ammonia.

The recovery of ammonia in coking operations does not offer the possibility for as attractive a selling price as does the gas, nor for such an astonishing range of products as does the tar. It more than compensates, however, for these shortcomings in the uniformity and excellence of its returns. This is as it should be. Ammonia is important in chemical manufacture, in refrigeration, and, as already mentioned, as a source of nitric acid for explosives manufacture in war time. But its great field is as an agricultural fertilizer. This use lies at the very basis of our national prosperity, and is continuing in peace or in war. A 4-foot vein of coal will yield enough sulphate of ammonia to fertilize the land lying above it for a thousand years.

To be more specific, coal contains from 1 to 1½ per cent. of nitrogen. At the minimum figures, this should yield 80 lbs. of sulphate of ammonia per net ton of coal; whereas the usual yield in bye-product ovens is one-fourth as much, or a little more. This is due to the unfortunate fact that when coal is distilled, the nitrogen is distributed among the products of distillation; the bulk of it (usually more than half) remaining in the coke. The rest goes into the tar, or into cyanogen, or as ammonia into the liquor and gas—there being also a possibility of loss as free nitrogen by ammonia dissociation. The distribution varies with the coal—a high nitrogen content not necessarily meaning a high ammonia yield.

Many attempts have been made (mostly in gas-retort practice) to increase the yield of ammonia from coal, in view of the large amount of nitrogen retained in the coke. The most promising of them seems to be the mixing of a little less than 2 per cent. of caustic lime with the coal to be carbonized. Results for a year at an English gas-works showed a gain of 1·68 lbs. of sulphate of ammonia per net ton of coal—the operations being benefited rather than otherwise.

The usual method of ammonia recovery in gas-works and in the first bye-product coke plants was as weak ammonia liquor obtained by washing the gas with water. In some of these earlier gas plants the liquor was sold to chemical establishments on the basis of the tons of coal carbonized, or even on the basis of the "ounce strength." This inaccurate test is now happily obsolete, depending as it did on the number of ounces of free sulphuric acid required to neutralize a gallon of liquor. These methods have now given place to the more equitable chemical test for actual NH_3 present, whether the product is liquor or sulphate.

The treatment of the ammonia liquor consists in distilling it in a column with direct steam, which drives off the free ammonia—lime being added to a lower portion of the still to free the fixed ammonia, and again distilling, in the same operation. The exit ammonia vapour, mixed with steam, is cooled sufficiently to yield the strength of liquor desired, and passes to the condenser if strong crude liquor is to be made, or to the saturator if sulphate is to be the product. There it encounters dilute sulphuric acid; and the sulphate of ammonia is formed and crystallizes out. The salt is removed from the saturator, washed, and dried (usually in centrifugal machines), and is then ready to bag for market. The strong crude liquor, which usually contains 15 to 22 per cent. of NH_3, is shipped as such in tank cars.

The latest coke-oven plants have adopted what is known as the semi-direct or direct methods of ammonia recovery, in which the gas from the ovens, freed from tar, is led directly into the dilute sulphuric acid; the production of sulphate thus being accomplished without the intervention of washing water or redistillation. In the semi-direct system, which is much used in this country, the preliminary removal of tar involves the production of a certain amount of ammoniacal liquor, which can be treated in a still and returned to the oven-gas before it enters the saturator, or can be made into crude strong liquor. This process is called semi-direct as all the ammonia is not made directly into sulphate. A direct system, in which no liquor is made, has also been developed and placed in operation in this country.

The sulphate of ammonia produced by either the old or the new method does not differ materially. The usual test is 25 per cent. NH_3, which, compared with 25·8 per cent., the chemically pure article, is a high degree of purity for a commercial product. A well-made sulphate will have from 0·8 to 1·5 per cent. moisture, and under 0·5 per cent. of free acid. The latter is easily controlled by using a slightly ammoniacal water for final washing in the centrifugal. A low free acid test is a great advantage, as the bags in which the sulphate is shipped last better.

Some of the German plants put out a dried and ground sulphate, which, being entirely deprived of moisture by kiln drying, tests over 25·25 per cent. of NH_3, and brings a slightly higher price. A corresponding grade is made in this country. It has a great advantage over other nitrogenous chemicals used for fertilizers in its fine mechanical condition, which makes it spread evenly by hand or in a grain drill or spreader. It is a question for serious consideration whether it would not be a wise measure to treat all the sulphate made in this way, in order to set a high standard, in view of possible German competition after the war.

Several methods have been proposed for using the sulphur in the gas to make sulphate of ammonia, rather than to resort to acid purchased from outside. Among these are the processes of Burkheiser and Feld. The latter seems to offer a prospect of success, though the alterations in the usual methods of gas treatment are quite radical. It has not as yet been tried in coke-oven work in this country, although a modified form is in operation at the Central Union Gas-Works in New York City, and a plant is being installed at Chester, Pa.

Mention has been made by some of the German technical journals of the use of gypsum (natural calcium sulphate) in place of sulphuric acid in making sulphate of ammonia. Details are not known; the process having never found much technical use because of the low yield. It would not be surprising, however, if it should become known later that Germany has used this process, or a modification of it, to produce ammonium sulphate and even sulphuric acid itself under the stress of war conditions.

Other developments in Germany are also of interest, both from a commercial and technical point of view. We know that Germany has had to very heavily increase her synthetic ammonia and cyanamide plants in order to obtain nitric acid for use in making explosives. The German cyanamide capacity is now said to be 500,000 tons per annum, and that of the Haber plant, at Ludwigshafen-on-Rhine, 300,000 tons of sulphate of ammonia; this being equivalent to 800,000 tons of sulphate of ammonia, and an increase of at least 500,000 tons over previous capacity. In order to induce private capital to build these plants, the Government have established a nitrogen monopoly, to continue in force after the cessation of hostilities. While the terms of this arrangement are not known, it is highly probable that any relief that they can get by shipping their surplus product into this country will be taken advantage of.

The production, importation, and consumption of sulphate of ammonia and equivalent in the United States for the last five years have been as follows:

	Production. Net Tons.	Net Imports. Net Tons.	Consumption. Net Tons.
1911	127,000	103,427	230,427
1912	165,000	81,089	246,089
1913	195,000	67,024	262,024
1914	183,000	89,158	272,158
1915	220,000	60,045	280,045

The prospects are that with the full operation of the existing plants, and those that will come into operation before the year is out, the production for 1916 will exceed that for 1915 by 30,000 or 40,000 tons. With upwards of 2600 new ovens under construction, it is highly probable that the years 1917 and 1918 will register successive large additions. It is not out of the way to estimate the sulphate of ammonia capacity of the country at the end of 1917 as 375,000 tons.

The price record of sulphate of ammonia, together with that of nitrate of soda and the equivalent cost of 1 lb. of nitrogen in each, is given by the author in a diagram. According to these figures, the price of the nitrogen in sulphate of ammonia has largely remained at the higher level of the two for some years past. But whether, in the face of the increased production, this record will be continued, of course, cannot be predicted.

Sulphate of ammonia is extensively used in ready-mixed fertilizers, which is the form generally purchased by the American farmer. These usually contain acid phosphate and potash, together with sulphate of ammonia, tankage, cotton-seed meal, &c. Sulphate of ammonia is dry in its nature, and makes an excellent mixture as far as mechanical condition goes, with the added advantage that it does not react with the other fertilizer chemicals to cause loss of nitrogen or reversion of the acid phosphate, both of which points are claimed against nitrate of soda. The nitrogen in sulphate of ammonia is quick to act; is not easily leached-out of the soil; and it continues its action over a considerable period, so that the growing plant is carried along to maturity without

set-back. Its disadvantage is the tendency to exhaust the lime in the soil. While this point is apt to be urged by agricultural experiment station men, it is really of minor importance, because the actual amount of sulphate of ammonia in the usual fertilizer application is small, and its nitrogen is relatively so much more beneficial to the growth of the crop. The liming of the soil, which, of course, overcomes all objection, is urgently recommended by all experiment station advisers, and in large areas of the Eastern States is practically the foundation of profitable agriculture. On the other hand, in some soils, as in those of Southern California and parts of Texas, which tend to excess of alkali, the action of sulphate of ammonia is peculiarly beneficial. In some soils sulphur is lacking; so that the sulphur in sulphate of ammonia actually acts as a plant food.

The actual demand for sulphate of ammonia depends, of course, on the demand for fertilizers in general, which, in turn, is affected by agricultural conditions. The consumption of fertilizer in 1914 is estimated at 7,631,000 tons, which at $20·00 per ton would be over $150,000,000. For the year 1913, it was 6,780,000 tons; for 1915, it is doubtful whether the 1914 figures will be exceeded.

Mention has been made of the use of ammonia in making nitric acid for explosives in war. This process rests on the original invention of Ostwald (United States patent No. 858,904, 1907), in which ammonia and air are passed through a heated tube in the presence of a catalyzer, as platinum sponge; the ammonia being oxidized to nitric acid. The original process did not work out successfully in practice, but later experiments, with different catalyzers, appear to have given more satisfaction, although but little was done in a commercial way. Under stress of war conditions, large amounts of nitric acid have been produced by this method in Germany. It has also been used to supply the place of nitrate of soda in sulphuric acid chambers.

Several different forms of the process have been developed by the various investigators; but so far as information is at hand none has been placed in operation in this country, although descriptions have been published from time to time in the Technical Press. The principle appears to be the same, in that in one type pure ammonia gas and air in the right proportions are brought into contact with a catalyzer electrically heated to about 700° C.; the product being nitric acid and water. This must be concentrated in order to obtain acid of the proper strength for nitrification purposes.

One of the obstacles is the necessity of thoroughly purifying the ammonia gas in order to avoid poisoning the catalyzer; but this, it is stated, may be greatly facilitated by using ammonium chloride, or presumably ammonium sulphate, in place of ammonia liquor.

(To be continued.)

The Lymn-Rambush Gas-Producer.

The issue of "Engineering" for the 11th inst. gave some particulars of this plant, now being introduced by the Lymn Chemical Engineering Company, Limited, of Tothill Street, Westminster. The whole of the ash zone is kept in a state of very slow but constant motion, which indeed is not confined to this zone, but extends also into the lower layers of the fuel zone above. The motion takes place in both a horizontal as well as a vertical direction; while at the same time there is a slow but regular removal of ashes from all parts of the base of the producer proper. Our contemporary remarks that, though at first sight it might seem as if the double-stage ash removal were a complication, it must be borne in mind that neither stage involves the use of any mechanical gear whatsoever, and that the ash ploughs themselves, being attached to the base of the producer, operate automatically and without manual attention. Moreover, their depth can be so regulated as to deal comfortably with any quantities and qualities of ash, without any of the difficulties attributable to a single-stage ash discharge. The final result of the arrangement is that all grades of coal—even the waste dump heaps of collieries, containing up to 40 or 50 per cent. of ash—can be satisfactorily used to produce good gas. The actual result of several months' night and day operation with colliery waste of a coking nature containing 35 to 40 per cent. of ash, was a production per ton of fuel gasified of 110,000 cubic feet of good gas, and when worked under ammonia recovery conditions 60 lbs. to 70 lbs. of sulphate of ammonia. It is stated by the designers of the producer that it is equally successful both with and without ammonia recovery, yielding maximum amounts of producer gas and ammonium sulphate respectively. A number of these producers are being erected in important munition factories here.

Society of British Gas Industries.—We learn from the Secretary (Mr. Arthur L. Griffith) that the autumn general meeting of the Society will be held in London, on Wednesday, Oct. 11. A programme of the arrangements will be issued in due course.

The Fixation of Nitrogen.—There was recently reported by "Nature" the formation of a Swedish Company to manufacture artificial fertilizers (such as ammonium nitrate, and other nitrogenous compounds) by chemical processes from easily accessible raw materials, without the aid of electricity. It is said that the company are preparing to turn out large quantities of products, and are greatly increasing their capital.

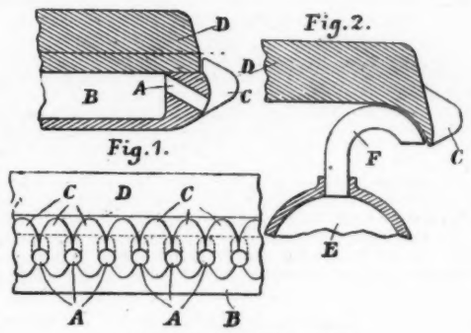
REGISTER OF PATENTS.

Burners for Gas-Stoves.

LUCAS, F. L., of Westbourne Terrace, Hyde Park.

No. 8765; Dec. 14, 1915.

These burners for gas-stoves are of the kind in which the outlets (at which the mixture of gas and air is ignited and burned) are inclined downwards and outwards at an angle between the horizontal and vertical, with the object of providing them with means whereby the issuing flames are turned upwards.



Lucas's Gas-Stove Burner.

Fig. 1 is a sectional elevation of the front part of one form of the device, and fig. 2 is a section of a modification.

The outlets A, from the box B, which receives the gas and air mixture, are inclined downwards and outwards, and are shielded by a series of conoidal projections C, which (in fig. 1) are formed on the box B, and projecting forwardly beyond it. The outlets are below and between the apices of the conoidal projections. The projections turn the flames issuing from the outlets upwards, and protect the outlets from foreign matter. In fig. 2, the conoidal projections C are formed on the fire-clay lump D, which is supported by, or forms the cover of, the box.

A very efficient burner is said to be made by the combination of the downwardly and outwardly inclined outlets and the conoidal projections.

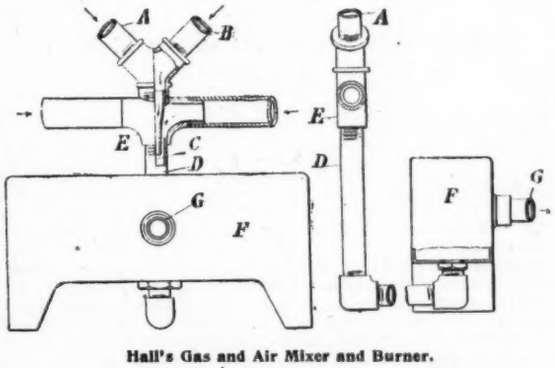
Fig. 2 shows an arrangement in which a box or pipe E replaces the gas and air mixing box of fig. 1, and the inclined outlets are constituted by the short bent tubular burners F; the conoidal projections C being formed on the cover D.

Mixing and Burning Gases.

HALL, L., of Edgbaston, Birmingham.

No. 9988; July 9, 1915.

This means for mixing air and gas for subsequent combustion refers more particularly to the type of plant in which a primary supply of compressed air is admixed with a supply of combustible gas—secondary air being induced at or about atmospheric pressure. In order to effect economy in the consumption of gas, the primary supply of air is supplied at a pressure exceeding 15 lbs. per square inch—preferably 25 lbs. to 40 lbs.



Hall's Gas and Air Mixer and Burner.

A part sectional front elevation of one form of the apparatus and a part sectional side elevation are given.

The pipe A connected to the supply of town gas is coupled to the arm of a Y union; while the pipe B, in connection with a supply of compressed air, is coupled to the arm of the union. The gas and air mixture issues through a jet C which extends below the air inlets, into a pipe surrounding which is a pipe D, with a T union E, to which are connected pipes in communication with the atmosphere. The ends of these latter pipes are preferably provided with adjustable regulators for controlling the supply of atmospheric air.

The pipe D is connected to a mixing-chamber F, which permits of the complete admixture of the gases before passing to the burner or burners by the pipe G connected to the mixing-chamber.

In operation, the gas and compressed air issue from the jet C (adjustable if so required) and creates a partial vacuum around the jet outlet,

which induces or produces a suction of air through the side pipes, thereby drawing into the pipe D a quantity of air at atmospheric pressure. The gas, compressed air, and atmospheric air pass into the mixing-chamber F, in which a complete admixture takes place—due to the pressure at which the gases enter the chamber. The mixed gases are then passed through the outlet of the chamber by the pipes G to the burners, where combustion takes place; "the result being a material economy in gas consumption owing to the introduction and mixture of air at atmospheric pressure."

Bunsen Burners for Heating Leather-Marking Tools.

ETNA LIGHTING AND HEATING COMPANY, LIMITED, and PROSSER, H. R., of Birmingham.

No. 10,074; July 10, 1915.

This invention relates to burners for heating tools, consisting of a portable stand for supporting the burner and a gas-cock having a projecting lever to which the lower end of a rod is pivoted, the upper end of which carries a cross rest which normally projects above the top of the stand and is there retained by a spring at an elevated position with the gas off in such a manner that, when the tool is pressed upon the rest in position for being heated, the gas is turned on and ignited by a bye-pass. The improvement comprises the application to such burners of a needle adjustment of the gas supply, which is supplementary to, and separate from, that of the gas-cock, and in connection with which the rest for the tool may be flanged-up at each end to prevent the tools slipping off while being held in the required position.

Ignition of Combustible Gas Mixtures in Burners under Water.

DEUTSCH-LUXEMBURGISCHE BERGWERK UND HÜTTEN AKTIEN-GESELLSCHAFT, of Bochum, Assignees of ADOLF VAN DE LOO, of Düsseldorf.

No. 10,250; July 14, 1915. Convention date, Aug. 17, 1914.

This invention relates to the ignition under water of combustible gas mixtures in burners designed, for example, for autogenous welding or cutting of metals and so forth. In such burners it is often desirable to effect the igniting of the flame under water, as otherwise it would be necessary to raise the apparatus after every accidental extinguishing of the flame, to light the gases in the air, and then lower the apparatus with the flame burning into the water—all of which prevents rapid and uniform working. At great depths also there is the additional difficulty that high gas pressures must be employed, and the outflow velocity of the gas is consequently very high, so that ignition in the air of the correct mixture for the high pressure working is impossible. It would be necessary first to ignite the usual mixture in the air and gradually to increase the pressure during the lowering of the burner into the water—"very difficult and, in practice, almost impracticable."

According to the method now proposed for the autogenous welding and cutting of metals and so forth, the oxygen is always supplied to the burner by a separate pipe from the source at the required pressure for working at the depth where the welding is to be effected; but a blow-off valve is provided on the oxygen pipe under the direct control of the diver, whereby whenever it is required to reduce the oxygen pressure at the burner in order to enable ignition to be effected, the diver is enabled to operate the valve, and so reduce the pressure in the burner to that at which the gases can be ignited. After this, he throws the valve out of operation, whereupon the oxygen supply at the pressure required for working at the depth in question is resumed, without any adjustment by the diver or by those controlling the supply.

Automatic Reversible Street Gas Lighter.

PICKETT, H., of Sunderland.

No. 10,846; July 27, 1915.

This invention relates to apparatus made to control the supply valve in each street lamp, alternately lighting and extinguishing the light by raising the pressure of gas about 10-10ths to 15-10ths. It comprises four small sections enclosed in a box which acts as a reservoir for the superfluous gas which accumulates by opening and closing the valves by means of small bellows, motors, or diaphragms.

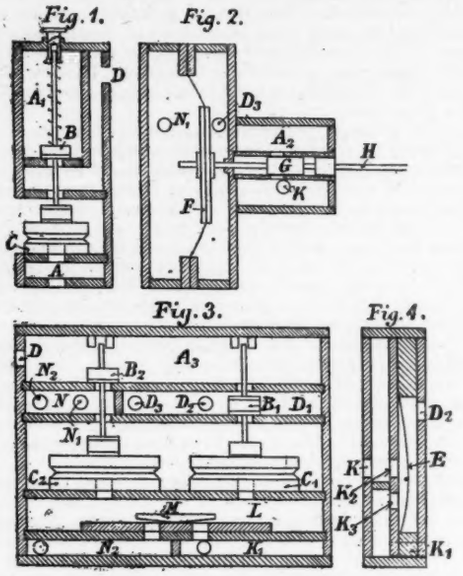
Fig. 1 (an end section of the primary movement) shows a bellows motor C, made of very thin sheep-skin leather glued to the motor, which is then screwed to its seat. A double valve B, made of aluminium and faced with best sheep-skin leather, is secured to a spindle which is tapped to carry it. A light sensitive spring, placed on the spindle so as to press on the valve B, can be regulated by a thumb-screw over the top, or the placing of small weights to suit the pressure.

Fig. 2 is an end section of the second movement showing a membrane or diaphragm F (also made of thin sheep-skin leather) of a plate of aluminium or other metal on each side, and fixed on a connecting rod H. This membrane or diaphragm controls a slide valve G, and is connected by the rod H to the valve which supplies gas to the burners in the lamps when the rod is moved—this being the last movement to light or extinguish the lamps.

There has previously been a slight discharge of gas from the chambers A^1 (fig. 1) and A^3 (fig. 3), due to the lifting of the valves B, B^1, and B^2. This superfluous gas is conveyed to the pilot light by a pipe connected as required. When the pressure in the mains is raised to open the gas supply valves, the extra pressure is transmitted also to the superfluous gas passing through the pipe, and thus lengthens the pilot flame and ensures the lighting of the burners. On closing the gas-valve it again lengthens the pilot flame, and thereby ensures the keeping alight of the bye-pass.

Fig. 3 is a front section of the third movement, showing a gas-chamber A^3, also bellows motors or diaphragm C^1 and C^2, spindles and double valves B^1 and B^2, which are similar in construction to fig. 1. In addition, there is a rocking valve or pallet M (faced with thin sheep-skin leather), which forms the hinge for it to work on.

Fig. 4 is an end section of the fourth movement showing the gas-ways, with a membrane or valve E to check the gas passing at alternate movements from K, through K^2 and K^3, into K^1. This membrane E consists only of a piece of thin sheep-skin leather.



Pickett's Street-Lamp Lighter and Extinguisher.

The operation (one movement) to light the street lamps is as follows: Chambers A, A^1, A^3 are charged with gas from the mains at the normal pressure. The valve B is then adjusted to resist the bellows motor C, which is thereby unable to lift the valve B at the normal pressure. The pressure has to be temporarily increased so as to enable the bellows motor C to lift the valve B and discharge gas through the groove D into chamber A^3 and into groove D^1, and through the inlet D^2, closing the membrane E, also passing through the inlet D^3, displacing the membrane F, bringing with it the slide valve G and connecting rod H which opens the supply valve, thus causing the lamps to light as already explained.

After this operation the gas pressure is reduced to normal again, and the valve B drops, closing the supply to the chamber A^3. The gas in the groove K is now able to pass the membrane E, through the ports K^2 K^3, which is freed by the supply being cut off due to the valve B being closed, and passes into the groove K^1 and into the chamber L, and closes the rocking pallet M over the groove N^2, lifting the bellows motors C^1 and C^2, closing the valve B^1, and opening B^2—this being preparatory to the operation of putting lights out.

To put lights out the operation is as follows: Raise the gas pressure from the normal, as required. The bellows motor C will then lift the valve B, discharging gas into the chamber A^3. This time the gas passes through the groove N into the inlet N^1, reversing the membrane F, slide valve G, and connecting rod H; thus closing the supply valve. The gas passes the inlet N^2, opening the rocking pallet M, and continues to hold up the bellows C^1 C^2 until the gas pressure is reduced to the normal, which causes the valve B to drop again, as already explained.

Gas and Fluid Meters.

TSUDA, G., of Tokyo, Japan.

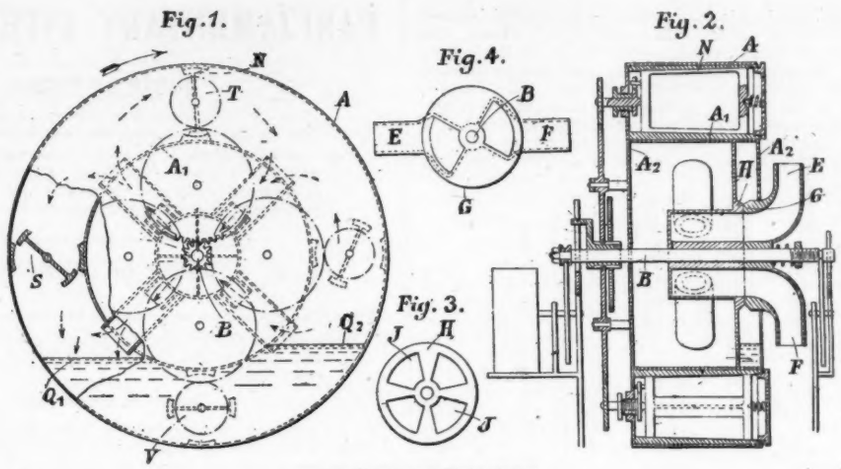
No. 10,621; July 21, 1915.

According to this invention, there is provided in a gas-meter the combination with a rotatable annular drum of a liquid seal in the bottom and a series of mechanical valves within the drum operated successively by the rotation of the drum to provide (in succession) a series of measuring compartments closed at one end by the liquid seal and at the other end by a mechanical valve, so that the pressure of the gas on the valve sets the drum in rotation and conveys to the outlet of the meter the gas or fluid which enters each chamber.

Fig. 1 is a front elevation of the meter, partly in section. Fig. 2 is a central section of fig. 1, with the part G turned through a right-angle to show it more clearly. Figs. 3 and 4 are details.

The meter consists of an annular drum formed by two cylindrical plates A A^1 and by end plates A^2. The closed space between A and A^1 constitutes the measuring chamber through which the gas is passed. The drum is mounted on a shaft B rotating on anti-friction rollers mounted on a fixed framework. Each end of the shaft extends through a slot in the frame so that the shaft is retained in its correct position on the wheels. At the back of the meter there are mounted inlet and outlet pipes E F for the gas; these pipes terminating in ports on the stationary valve seat G. The two pipes extend horizontally from the shaft, as shown in fig. 4; but in order to show them both in fig. 2, they are illustrated in a vertical position. The valve seat is loosely mounted on the shaft so that it does not rotate with it, and is pressed forward by a spring against a valve plate H carried on the drum. This valve plate has a series of ports J communicating separately with a radial tube which extends into the annular space between the plates A A^1.

The ports in the valve-seat and valve-plate respectively are sector-shaped, and, consequently, the spaces between them are of similar



Tsuda's Gas and Fluid Meter.

shape. The ports are so dimensioned that the angle of any port J on the valve plate is smaller than the angle of the bar on the valve seat G; so that in no instance can a port provide communication for the gas between the inlet and outlet ports. Similarly the angle of any bar on the valve plate H is smaller than the angle of the ports, so that at no time can either the inlet or outlet port be completely closed—communication always being provided from each of them to the measuring chambers of the drum.

The operation of the meter is as follows: The gas, entering from the inlet pipe E, passes to the interior of the drum on the left-hand side in fig. 1. The gas pressure is exerted upon the closed valve N and upon the liquid at Q^1. As the outlet side of the drum is in constant communication with the outlet port F, the level Q^2 of the liquid is higher than that of Q^1, and the pressure on the right-hand side of the valve N at the top in fig. 1 is less than that on the left-hand side. The drum is, therefore, caused to rotate in the direction of the arrow. During the rotation of the drum the valve S (fig. 1) is brought to its closing position before the valve T opens; and a closed measuring compartment is therefore provided between the two valves, filled with gas. Further rotation of the drum causes the valve T to open so that the gas can escape through the outlet of the meter. It will be seen therefore that the measurement of the gas is effected independently of the liquid in the meter in a chamber of a definite capacity; the chamber being constituted solely of rigid or stiff material—no flexible material being used in the meter for measuring purposes.

When the valve S reaches its closing position, the pressure of the gas acts upon it to continue the rotation of the drum, and the valve V similarly follows. Thus as long as the outlet for the gas is open the pressure on the inlet side causes the drum to rotate; and the measuring action is repeated in a series of closed measuring compartments which convey the gas from the inlet to the outlet of the drum. Further, there is always free communication from the inlet to the interior of the drum, and from another part of the interior of the drum to the outlet; so that there is no fluctuation or irregularity in the supply of the gas.

Rotary Compressor or Exhauster.

JOHNSTON, J., and the GLOBE PNEUMATIC ENGINEERING COMPANY, LIMITED, of Victoria Street, S.W.

No. 12,359; Aug. 27, 1915.

This rotary compressor or exhauster is of the type comprising two members arranged one within the other and eccentrically to one another, and having an annular liquid piston occupying the space between the members.

In connection with such apparatus it has hitherto been proposed to provide a helical chamber formed in the inner rotary member, or on the member, by means of a helical vane or thread; while to secure the necessary degree of compression or exhaustion this member has been made conical or tapered. This construction, however, possesses the disadvantage that a wedging action is liable to take place between the inner member and the liquid, owing to the inability of the liquid displaced by the larger part of the inner drum to escape freely, with the result that the outer casing is subjected to severe stresses and is liable to burst.

The object of the present invention is to devise apparatus possessing the advantages of the above-named construction as regards degree of compression and exhaustion obtainable without its attendant disadvantages, by providing a form of apparatus (of the type first referred to) in which the inner rotary member comprises a disc which may be either radial or conical or inclined, and such that the liquid forming the piston has free access to both sides of it—the disc being provided with one or two threads or helical or spiral vanes set at an inclination to the face of the disc, so as to trap the air or gas being operated upon, and force it outwards over the edge of the disc.

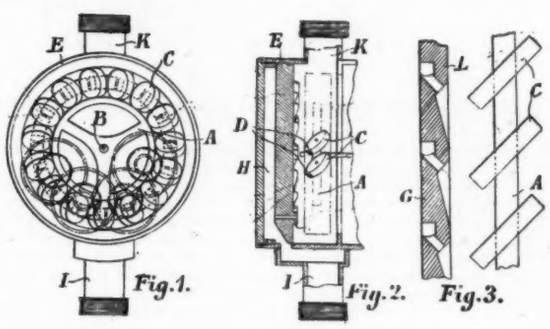
Gas-Meters.

ANDERSON, JOHN, of Edinburgh.

No. 12,878; Sept. 8, 1915.

This invention consists in a rotary meter, the rotor of which is formed by a number of cups or pockets around the periphery of a wheel, the bases being at an angle of 45° thereto, co-operating with a series of jets formed by cut-out portions of a disc making guiding faces for ensuring that the gas shall be directed to the cups in streams substantially normal to the bases thereof.

Fig. 1 is a front elevation (with some of the parts not illustrated). Fig. 2 a side sectional elevation. Fig. 3 is a sectional view of details to an enlarged scale.



Anderson's (Alder and Mackay) Gas-Meter.

The aluminium wheel A is mounted on a horizontal spindle B; and around the periphery of the wheel are mounted fifteen light aluminium cups C, with flat bases about ½-inch diameter and upstanding edges about ½-inch high. Each cup is provided with a notch D, and the cups are set around the periphery of the wheel on their edges in such a position that the notches lie on the side from which the gas is to be delivered to the wheel. The cups generally stand at an angle of about 45° to the vertical plane, which passes along, and through, the horizontal spindle B.

This spindle is mounted in a casing having a back plate and a further plate G between the back plate and the wheel A. The space H between the two plates is in connection with the gas inlet I, and the space J in front of the plate G is in connection with the outlet K. The plate G has an annular ridge L with angular cuts on its face—each formed of two parts, a gradually sloping part and a more steep sloping part. Holes are drilled through the plate G, so that gas entering from the space H, on issuing from the holes, is guided direct into the cups C.

In operation when gas is passing, the rotor is set in motion, and the notch D taken out of one side of each cup (as explained) allows the blast of gas to escape without acting upon the instrument as a brake. The motion is communicated by gearing to indicating dials, similar to those in use on ordinary meters.

Automatically Igniting Gas-Burners.—No. 100,934.

SOUTH METROPOLITAN GAS COMPANY and SOMERVILLE, J. M., of Old Kent Road, London.

No. 5462; April 13, 1916.

This invention has reference to gas-burners to be ignited by a "spitfire" or bye-pass jet, which is itself ignited by an electric igniter—the gas being admitted to, and cut off from, the bye-pass, and the circuit for the electric igniting current being connected up and broken, by the force of the gas pressure. A slide valve, which is also a contact-carrier, is actuated by a collapsible chamber, preferably of the aneroid barometer type, to which gas is admitted so as to cause the chamber to move the slide valve when gas is turned on to the burner, first to uncover the bye-pass and complete the electric circuit, and then, by a continuation of the movement in the same direction, to close again the bye-pass and break the circuit.

Fig. 1 [p. 354] shows, in sectional elevation in its extreme positions, a piston valve and means for operating it. Fig. 2 gives views of a slide valve of D form. Fig 3. is a diagrammatic elevation of an inverted lamp fitted up with the lighting arrangement.

A is a gas supply pipe for the burner. B is a space open to the gas-passage and open also to a collapsible chamber C—preferably of the aneroid

type and consisting of annular plates of pressed or spun metal fastened at their edges and backed at one end with a plate slightly dished. The space B is entered by the pipe D, which conveys the gas for the igniting or "spit-fire" jet. The orifice of this pipe D is controlled by the slide valve E, which in fig. 1 is shown as a piston valve and in fig. 2 as a D valve. The action of the valve in both cases is identical. It is connected by a rod F to the end plate of the chamber C, so that as the chamber expands or contracts the valve is moved to and fro (into the positions illustrated) according to the collapsed or expanded condition

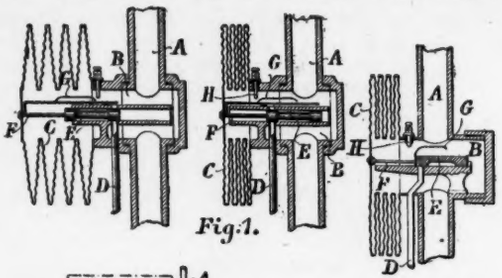


Fig. 1.

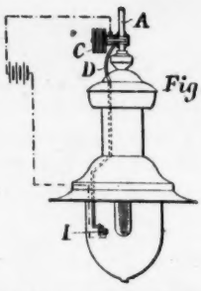


Fig. 3.

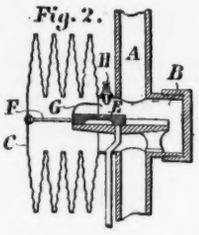


Fig. 2.

Somerville's (South Metropolitan Gas Company) Automatic Lighter.

of the chamber due to the presence or absence of gas pressure. G is a spring contact carried by the valve E and adapted to engage the terminal H which protrudes into the space B. In the extreme positions of the valve the enlargements carried by it overlie and close the orifice of the pipe D; likewise in the same positions the spring-contact G is clear of the terminal H. Intermediate positions of the slide valve permit the passage of the gas to the pipe D around or beneath the narrowed portion of the valve, and at the same time close the electric igniting circuit through the spring G and terminal H.

Normally the apparatus is in the position shown in figs. 1 and 2—when the lamp is out. Gas pressure being, however, admitted to the pipe A, the space B, and the chamber C, the slide valve E at once begins to move towards the left, with the result that gas is supplied to the bye-pass D and current to the electric igniter I (see fig. 3) and the burner is lighted. Ultimately the movement of the value being continued, the pipe D is again closed and the circuit broken. On withdrawing the gas pressure, the parts quickly resume their normal position.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 16.]

Nos. 11,097—11,436.

Aarts, J. G.—"Production of ammonia from coke." No. 11,202.
Aarts, J. G.—"Carbonizing or reducing furnaces." No. 11,203.
Adnams, A. C.—"Water-heating apparatus." No. 11,339.
Akt.-Ges. Brown, Boveri, et Cie.—"Guiding-apparatus of multicellular steam and gas turbines." No. 11,244.
Andrews, J. D. F.—"Lamp-burners." No. 11,196.
Becket, W. H.—"Gas-heated cooking-stoves" No. 11,127.
Bolton, J. A.—"Metal heating furnaces." No, 11,271.
Cervera, V.—"Gas-producer." No. 11,373.
Dempster, R. & J.—"Manufacture of hydrogen gas." No. 11,413.
Hersey, M. H.—"Burning-off machines for gas-mantles." No. 11,384.
Ionides, A. C.—"Utilization of combustible gaseous mixtures." No. 11,374.
Nelson, J.—"Treatment of hydrocarbon oils" No. 11,313.
Parker, J. W —"Gas-producers." No. 11,231.
Paterson, R. H.—"Deodorizing, sweetening, and drying carbonic acid and other gases." No. 11,177.
Petrol Patents, Limited.—"Treatment of hydrocarbon oils." No. 11,313.
Rasmussen, C. O.—"Production of gas from peat, lignite, or wood." No. 11,136.
Robertson, J. G.—"Treatment of hydrocarbon oils." No. 11,313.
Roelofsen, J. A.—"Regenerative coke-ovens." No. 11,318.

Melton Mowbray Gas Company.—The annual meeting of this Company was held on Friday, when dividends of 6¼ and 5 per cent. were declared. During the past year, owing to the extraordinary rise in the price of coal and the decreased sale of gas, a slight increase in the price of gas has been necessitated. The decrease in the public lighting amounted to £268. During the year the Manager (Mr. G. R. Casterton) had arranged for the chimney-shaft at the works to be rebuilt; while a 2-ton motor lorry for carting coal and coke had been purchased.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:

Commons amendments to Bills considered and agreed to: Conway and Colwyn Bay Joint Water Board [Lords], Newcastle-upon-Tyne and Gateshead Gas [Lords]. Both these Bills received the Royal Assent on Thursday.

HOUSE OF COMMONS.

The following further progress has been made with Bills:

Bills read the third time, and passed with amendments: Conway and Colwyn Bay Joint Water Board, Newcastle-upon-Tyne and Gateshead Gas.

Supply of Boiler Tubes.

Sir J. Lonsdale, last Wednesday, asked the President of the Board of Trade if he was aware that the practical monopoly of the supply of boiler-tubes suitable for water-tube boilers in this country was in the hands of the British Mannesmann Tube Company, and that, on June 30, 1915, of 15,000 ordinary shares and 19,000 preference shares in the Company, 14,830 ordinary shares and 18,873 preference shares were held by enemy aliens resident in Germany; if this firm was a controlled establishment under the Munitions of War Act; and if any steps had been taken under the Trading with the Enemy (No. 2) Act, 1916, to transfer the enemy interests in this concern to British shareholders?

Mr. Harcourt replied that the British Mannesmann Tube Company, Limited, was a controlled establishment under the Munitions of War Act. The right to transfer the shares belonging to enenies had been vested in the Public Trustee, who informed him that he had now completed negotiations for their sale.

Coal Prices.

Mr. W. Thorne, on Monday last week asked the President of the Board of Trade how many resolutions he had received from various organizations in different parts of the country protesting against the Board of Trade giving power to the South Wales colliery owners to increase the price of coal from 4s. to 6s. 6d. over and above the pre-war prices; if he was aware that it meant increasing the price of coal from at least 4s. per ton over and above the prices paid before the extra 2s. 6d. was put on; and if he intended taking any action in the matter?

Mr. Harcourt replied that about twenty resolutions had been received. He did not follow the second part of the question, as an increase in the maximum price of 2s 6d. should not produce an increase of 4s. in the prices charged.

Mr. Snowden inquired whether Mr. Harcourt was not aware that large gas consuming corporations were to-day being charged by coal-owners anything up to 4s. a ton above the standard price fixed under the Act?

Mr. Anderson desired to know whether any decision had yet been reached in regard to the application received from the coalowners of the Forest of Dean for permission to increase the price of coals; whether he was aware that the owners of this district at the time of the passing of the Price of Coal (Limitation) Act were granted the concession of charging 5s. per ton above pre-war prices, as compared with 4s. a ton to other owners; whether he was aware that some collieries in the district had made large profits in consequence; upon what grounds the owners now apply for a further concession, seeing that nearly the whole of the coal produced in the district was for home consumption; and what steps, if any, the Board of Trade proposed to take to ascertain the cost of production in the district since the passing of the Act?

Mr. Harcourt said he had not yet been furnished with definite particulars of working costs in this case. The application was made by the Forest of Dean Joint Minimum Wage Board, on behalf of the miners as well as the owners, and it was largely based on wages considerations. The increase of the standard amount to 5s. was granted in order to avoid a reduction of wages, and would only operate for a portion of the year, and he had no reason to think that large profits had been made in consequence of this increase.

Sir A. Mond, on Wednesday, asked the President of the Board of Trade whether he was aware of the public opinion in South Wales against the permission granted to the coalowners of South Wales and Monmouthshire to increase the price of coal beyond the Price of Coal (Limitation) Act; and whether he could state the reasons for granting this permission?

Mr. Harcourt made the following reply: As I have stated in reply to previous questions on this subject, the increase of 2s. 6d. in the maximum pit-head price in South Wales of coal sold for home consumption was granted in respect of an average increase in working costs of 2s. 6d. a ton.

Low-Temperature Carbonization.

Mr. Fell, on Thursday, inquired of the Minister of Munitions why the Government had withdrawn from the arrangement made with the Barnsley Company to put up a plant to work the new process of carbonizing coal at low temperature for the production of materials for explosives and dyes; if the Government had paid £10,000, and had proposed to pay a further £15,000 against similar sums paid by the Barnsley Company; if the failure of the Government to carry out the arrangement had delayed this important plant, which was urgently needed, and from which so much was expected; and if the soft coke from the low-combustion process was more valuable as a fuel than the hard coke, though not so suitable for smelting purposes?

Dr. Addison said that the Government had not withdrawn from any

agreement with the Barnsley Smokeless Fuel Company. The Government took £10,000 in debentures in the Company, but had not been disposed to assist further, in view of the slow progress made in the erection of the plant by the Company, and because it now appeared doubtful whether the process would prove of much service in the production of munitions. There had been no failure of the Government to carry out their obligations; the failure had been on the part of the Company. He had no information as to the value of the coke resulting from the low-combustion process, except that it was of small value for smelting purposes, and therefore of but little importance in the production of munitions.

Mr. FELL remarked that the question did not mention the word agreement, and asked if it was not a fact that an arrangement was come to that the persons putting up this factory should put it up pound by pound with the Government. The Government advanced their £10,000 and the people advanced their £10,000, and there was £15,000 further to be advanced by each. The Government then withdrew.

Dr. ADDISON: We were not satisfied.

Mr. FELL: Is it not a typical example of a case where there are very wealthy vested interests opposing it, and it is difficult to get the Government to undertake anything?

Dr. ADDISON: I do not know where the vested interests are at all. All I know is that we are advised that this does not seem likely to be a success.

Mr. PRINGLE: How much Government money was expended before you came to the conclusion that it was a failure?

Dr. ADDISON: The money it was decided to advance was £10,000.

Mr. HOUSTON: Will this money be lost to the nation?

Dr. ADDISON: No, I do not think it will be all lost.

Production of Nitrates.

Mr. HAYDN JONES last Tuesday asked the Parliamentary Secretary to the Board of Agriculture whether the attention of the Government had been called to the fact that the United States proposed to appropriate a sum of $20,000,000 for the purpose of determining the best process, securing the necessary water power, and erecting suitable plant for the production of nitrates; and whether the Government would appoint a Committee to ascertain the possibility of utilizing the water-power of Wales for this and kindred purposes?

Mr. ACLAND replied that the question of increasing the supplies of nitrates was being actively considered. It, however, appeared doubtful whether our available water supplies were sufficient to make production by water power the means best suited to this country.

Wrexham Water Company.

The fifty-sixth ordinary general meeting of the Wrexham and East Denbighshire Water Company was held last Tuesday—Mr. H. Croom Johnson presiding. After payment of the usual charges, dividend upon the preference stock, the interim dividend at 7 per cent. per annum upon the consolidated stock, £4 18s. per cent. per annum upon the ordinary stock for the half year ended Dec. 31, 1915, and interest upon the mortgages and debenture stock for the whole year, a balance remained on net revenue account of £6754. The Directors recommended the payment for the half year of the preference dividend free of income-tax, and also dividends at the rate of 7 per cent. per annum upon the consolidated stock, and £4 18s. per cent. per annum upon the ordinary stock, less income-tax. The recommendation was adopted. The year's expenditure on capital account, amounting to £988, was incurred in carrying out small extensions of mains rendered imperative to meet the demands of consumers, and also in completing some work to increase the yield from the present sources of supply. The adverse balance on capital account amounts to £11,079, and having regard to the National requirements, coupled with the difficulties attending the raising of capital under present conditions, the Directors have not found it expedient to exercise the powers in this respect, conferred upon them at last year's annual meeting.

Reduction in Price at Rochester and Chatham.

When addressing the proprietors at the half-yearly meeting of the Rochester, Chatham, and Gillingham Gas Company, the Chairman (Alderman E. W. Willis, J.P.) was able to make the gratifying announcement that the Directors had decided to reduce the price of gas 2d. per 1000 cubic feet as from the reading of the meters for the quarter ending Sept. 30. He said that, in spite of the Summer Time Act and the various restrictions on lighting, the demand for gas during the past six months had been practically the same as in the corresponding period of the previous year. The reason for this was the increasing use of gas for commercial purposes. Coal had cost £8345 more than in the corresponding half-year; while war bonuses totalled £2179, and the allowances to men on active service £432. These were big figures. Since the commencement of the war the Company had paid allowances to men in the services to the extent of £2127. He thought they would agree that the Company had behaved very well, and in a way such as every shareholder would desire. Residuals came out better than usual; and in the matter of coke, a little different system had been adopted, for much of the coke sold was to themselves for the manufacture of water gas. The Directors had decided to issue some fresh stock. They were going to put on the market £20,000, at £82 10s. per cent.; and, for the inducement of those who desired small amounts, it would be in sums of £10 or multiples. He bore testimony to the able manner in which the Engineer and General Manager (Mr. C. Valon Bennett), the Secretary (Mr. W. H. Day), and other officers, had conducted the affairs of the Company. The report, which was adopted, stated that no fewer than 66 men had left the Company for active service (of whom three had unfortunately lost their lives); and it recommended the payment of a dividend at the rate of 4½ per cent. per annum, less income-tax, upon the consolidated ordinary stock—the full statutory dividend under the sliding-scale.

LEGAL INTELLIGENCE.

THE GERMAN SYNTHETIC AMMONIA PATENTS.

Licences Granted to an English Company.

Last Wednesday [as reported in the "Chemical Trade Journal"], in the Patents Court, the Comptroller heard an application by Gas Developments, Limited, of Charles Street Works, Walsall, for licences to use three German patents for the manufacture of ammonia from hydrogen and nitrogen by the synthetic process.

Mr. GERALD DODSON, for the applicants, explained that the application was of great importance from a national point of view. The Company was incorporated about two years ago for the production of gases, and particularly the production of ammonia. Up to the present moment the matter had been of an experimental nature—the specifications of three German patents owned by the Badische Anilin Company being followed. The patents in respect of which the application was made were those that had to do with the production of ammonia by the synthetic process from hydrogen and nitrogen. The patents were assigned to the Mersey Chemical Works, Limited, of City Road, London, for £215, and 50 per cent. of the profits; but that Company had not worked them. The legal position appeared to be clear; and there only remained the consideration of the circumstances under which the licences should be granted. Counsel then quoted from an article entitled "German Nitrogen Production Developments," published in the "Chemical Trade Journal" of June 17 last, and said that this article showed the great strides made by the Germans in the manufacture of ammonium sulphate by the synthetic process during the last five years. In this country at the present time there was not an ounce of synthetic ammonia manufactured; but five years ago a Company in Germany, with the assistance of the German Government, commenced, with a capital of two millions sterling, to produce ammonia by the synthetic process, and at present the output had reached over 500,000 tons per annum. While they did not say the patents in question were bad, the applicants contended that the specifications were none too intelligible, and it had taken the applicants fifteen months of experimental and research work before they came to the conclusion that they could manufacture the substance on a commercial basis so that a profit could be obtained.

The COMPTROLLER: Your point is that you have been put to all this trouble, and should not pay too heavily for the licences?

Mr. DODSON: Yes; I ask, in the circumstances, that the royalty demanded should be small.

Dr. *E. Maxted*, Director of the applicant Company, said his first two or three attempts to make ammonia from hydrogen and nitrogen by the synthetic process failed; but after persisting he succeeded. Although at present they had only worked on the laboratory scale, they were ready to commence on the commercial scale if the licences were granted. Altogether they had spent £1500 on research. He thought at the start they could produce 40 tons a week; and they had at their disposal processes for the manufacture of the pure gases essential for the production of ammonia. The price of sulphate of ammonia was £16 a ton; but he thought this price could be much reduced. It had been done in Germany, and there was no reason why it should not be done here in England. The plant would be expensive; but he thought the Company could commence with a capital of between £20,000 and £30,000.

A discussion then took place on the question of the royalty to be paid to the patentees (through the Public Trustee). The Comptroller suggested 5 per cent. of the selling price. Eventually, the applicants offered 2½ per cent.

The COMPTROLLER announced that, although he would grant the licences, he would consider the question of royalty.

Gas Meter and Fittings Theft.

At the Spelthorne Sessions, on the 9th inst., a man named Henry Shakespear and his wife were charged, on remand, with stealing 4s. 3d. from a gas-meter at Teddington, on July 21, the money of the Hampton Court Gas Company. A further charge was preferred against the prisoners of stealing, on July 28, a quantity of gas-fittings and lead-piping, valued at £4 10s., from a house in Kingston Road, Teddington. Detective Sutherland said that after the remand the previous week he said to prisoners, "I understand you have been trying to dispose of some gas-fittings at a place in Twickenham." The male prisoner replied, "I stole them from an empty house. My wife was outside the house." The male prisoner pleaded guilty and asked for leniency towards his wife, as it was all his fault. The woman said that her husband did it to get food for both of them. Two previous convictions were proved against the man, and it was said he was a deserter from the Army. The male prisoner was sentenced to two months' imprisonment on each charge, to run consecutively, and the woman was again remanded.

Military Service Exemption at Lewes.—The Local Tribunal for Lewes have had before them an application by the Lewes Gas Company for exemption for Mr. W. Davidson (26), Assistant Manager and Chemist, on the withdrawal of his munitions badge. It was stated that he was the only Chemist at the gas-works, and that he attended to many details when the Manager was engaged elsewhere. Mr. E. Jones, the Manager at the gas-works, said this was the first man for whom the Company had claimed exemption. They had allowed every man who could possibly be spared to enlist—22 employees out of 41 had gone. A claim would not have been made in this case but for the fact that Davidson was the only one at the works capable of doing his particular class of work. Conditional exemption was allowed upon the man's occupation remaining the same and upon his joining the Volunteer Force.

MISCELLANEOUS NEWS.

BRITISH DYES LIMITED.

Directors' Report on the Work Done.

The Directors of British Dyes Limited, in their report to the shareholders issued last Friday, state that they will not be in a position to adjust finally the accounts of the Company for the year to April 30, until they have arrived at a settlement with the revenue authorities in regard to the duties payable under the Finance Act, 1916; and they are in consequence compelled to postpone for some time the issue of the balance-sheet and the holding of the general meeting of shareholders for its consideration. They have accordingly resolved to make the following report on the progress and work of the Company; and as soon as the accounts are adjusted, the ordinary general meeting will be called and the balance-sheet will be submitted.

CAPITAL.

The issued share and loan capital consisted as at Aug. 1 of: Share capital subscribed (864,179 shares of £1 each, 10s. per share called up), £864,179; loan from the Government, £1,064,179—total, £1,928,358. Since the date of the report submitted to the statutory meeting of the Company on July 5, 1915, the subscribed share capital has increased by £208,080—and the loan to which the Company is entitled from the Government has increased by £209,629—making together an increase of £417,709.

ORGANIZATION.

The Board have established: (1) A Committee of Directors, which gives continuous attention to the affairs of the Company; (2) a Technical Committee, which combines the heads of the technical and scientific departments, with Dr. Forster as Chairman; (3) a Research Department, of which Professor W. H. Perkin is the head. [On account of the delay and expense which would have been involved in erecting during the war a central research laboratory, it has been arranged that in the meantime the research work, so far as not conducted in the works laboratories, should be carried on in the laboratories of different universities, under the supervision of the professors of organic chemistry. Research colonies have been established in this way, employing a number of assistants, under the respective professors, and much important work is being carried out]; (4) an Advisory Council, which consists of twelve eminent professors of chemistry connected with different universities, in addition to the members of the Technical Committee. It has been formed for the purpose of increasing the number of chemists, and promoting research in organic chemistry, and particularly in that branch of it which relates to coal-tar colours. The Company have offered to place at the disposal of the professors an annual grant for the remuneration of honours graduates in chemistry who have received special instruction in coal-tar products, and who are prepared to continue their training as research assistants. After such training the Company will be prepared to offer employment to suitable men recommended by the professors. The Directors have also agreed to make a grant of £5000 towards a scheme for the development of advanced teaching and research in tinctorial chemistry in the Technical College of Huddersfield.

IMMEDIATE SUPPLY OF DYES.

Notwithstanding the restriction caused by the shortage of certain materials owing to the war, the supply of dyes from the Company's works has been greatly increased. New plant has been erected, and is in course of erection, for further increasing the supply of those dyes which are most in demand, and which can be made in large quantities from the materials available. In the near future the supply will be further substantially augmented. The Company has also sent to the Swiss manufacturers considerable quantities of raw materials and intermediate products, without which they would not have been able to continue their supplies to the British markets. [A report from Mr. Turner, the Manager of the Company's works, in regard to the supply of dyes is appended to the Directors' report.] A Committee appointed by the Board of Trade has made an exhaustive inquiry into the colour requirements of this country. Mr. Turner, who represents the Company on the Committee, has, with the authority of the Board of Directors, submitted proposals for the prevention of overlapping in manufacture and for utilizing the resources of all dye makers in the country to the fullest advantage.

SUPPLY OF RAW MATERIALS AND INTERMEDIATE PRODUCTS.

After conferring with a number of the leading users of dyes, the Directors decided, so far as the new works are concerned, to provide, in the first place, mainly for manufacturing on a large scale, raw materials and intermediate products. They desire to call particular attention to two important considerations: (1) In order to secure a permanent national supply of dyes, it is imperative that the manufacture of the intermediates from which dyes are made should be successfully established in this country; (2) the production of these intermediates requires the operation of a series of processes not hitherto worked on a commercial scale in this country; and it also requires complicated and expensive plant. A large amount of research and experimental work has been done; and a considerable quantity of plant has already been erected for the production of intermediates. Other important plants are under construction—including plants for para-nitraniline and beta-naphthol. As regards raw materials, the benzol and phenol plant has been largely increased. An acid plant, sufficient for the Company's requirements, is approaching completion; and a large part of it is in operation.

NEW WORKS.

When the Turnbridge works of Messrs. Read Holliday and Sons were acquired by the Company, considerable extensions were in course of construction by that company; and these have been completed. After careful inquiry with regard to sites elsewhere, an additional freehold site extending to 343 acres was acquired at Huddersfield. A railway connecting this site with the Turnbridge works and with the London and North-Western Railway has been constructed, which, with its branches and sidings, extends to about eleven miles of single line. Buildings for the accommodation of a large amount of plant have been completed at the Turnbridge works and on the new site. A portion of the new plant has been installed in these buildings; and important materials and products for making dyes are being obtained from it—including a supply of the acids required. A large amount of additional plant is in course of manufacture and erection. A new works laboratory has been completed at the Turnbridge works; and a second, including provision for large-scale experiments, is approaching completion on the new site. These laboratories will give suitable accommodation to the staff of chemists, which has been largely increased. Works and plant for the supply of water, ice, electricity, and steam are in course of construction and are partly in operation. The construction of the additional works and plant has been carried on under conditions of special difficulty, as regards time and cost, on account of the scarcity of the materials and labour required for such work and of the difficulty in obtaining deliveries of the plant from the makers, and also because a large part of the work was carried out during a winter of exceptional inclemency. Nevertheless, substantial progress has been made; the total contents of the new buildings erected at the old and new works being not less than 25,000,000 cubic feet and the floor area covered 1,200,000 superficial feet—about 27 acres.

INTERNATIONAL ARRANGEMENTS.

As the result of Conferences with a Commission specially appointed by the French Government, the Board have adjusted a provisional agreement with Le Syndicat National des Matières Colorantes—a national company which has been formed in France with the support of the French Government. This agreement provides for a complete exchange of knowledge and processes, and for the formation of an inter-allied Company to establish co-operation between the two Companies in regard to the production of intermediates and dyes. This Company will enable the resources and skill of Great Britain and France to be combined in providing a supply of these products on the most favourable terms. It is intended that the inter-allied Company should be a means of bringing about co-operation with other dye manufacturers in Great Britain, France, and other allied and friendly countries.

GAS SUPPLY OF THE PARISIAN SUBURBS.

The annual report for 1915 of the Société d'Eclairage, Chauffage, et Force Motrice—the Company concerned in the supply of gas chiefly in the suburban districts of Paris—marks the exceptional war-time conditions.

The quantity of gas supplied for consumption was 124,114,061 cubic metres [4383 million cubic feet], a decrease of 4,844,409 cubic metres [171 million cubic feet] compared with 1914. Comparison, however, of the make of gas during the last five months of 1914 and 1915 shows an increase in the latter period of about 8,000,000 cubic metres [282 million cubic feet], due largely to the development in the environs of Paris of industries engaged in the national defence, and partly to the wider adoption of gas heating, occasioned by the high price of coal.

During the year comparatively little was done in extending the Company's service. New mains to the length of only 10 kilometres [about 6 miles] were laid—making a total of 2488 kilometres [1543 miles]; while 300 fresh "rising pipes" brought the total of these latter to 22,086, and the number of branch pipes connected to them or to the street-mains to 279,583.

With the object of mitigating the effect of the phenomenal rises in the price of coal during 1915, the Company in July of last year entered into negotiations with the Inter-Communal Syndicate, representing 63 of the most important communes covered by its concession. The Company proposed an adjustment of the price of gas in accordance with that of coal—suggesting a maximum of 20 c. per cubic metre [4s. 6½d. per 1000 cubic feet]. To this, a number of communes very readily agreed; and this rate came into operation in respect to them on Nov. 1, 1915. Others, however, stubbornly opposed all mutual adjustment; and, besides this, the new scale was quickly rendered inadequate by the further great advances in the price of coal at the end of last year. New measures were then contemplated, but were rendered unnecessary by the judgment of the Conseil d'Etat in the case of the Bordeaux Company—already reported in the columns of the "JOURNAL." It is hoped that in the revised circumstances created by this judgment the Company will be able to reduce its losses and safeguard its position in the future.

Bournemouth Gas and Water Company.—The Directors' report for the six months to June, to be presented at the meeting of the proprietors next Friday, states that the sales of gas, taken as a whole, showed an increase of about 1½ per cent.; but the water-rental slightly diminished. The revenue expenditure increased mainly under the head of repair of works, in consequence of heavy charges for overdue renewal of the retorts at the Poole works, now in course of being carried out. After writing off £3500 for works superseded, the Directors recommend the statutory dividends (less income-tax) of 6, 7, and 15 per cent. on the preference, "B" ordinary, and original shares respectively. These dividends will amount to £20,609, and leave £25,683 to carry forward. "The Directors, with deep regret, record the death of their colleague Sir Corbet Woodall, D.Sc., who for nineteen years was a member of the Board. During this period his services were of the highest permanent value to the Company, at whose disposal his unrivalled experience and judgment were always freely placed. To fill the vacancy thus caused the Directors have elected the Rt. Hon Sir Daniel F. Goddard, M.P., who will bring to the Company a long and valuable experience in the administration of numerous other gas undertakings."

To obtain the

BEST RESULTS

Engineers

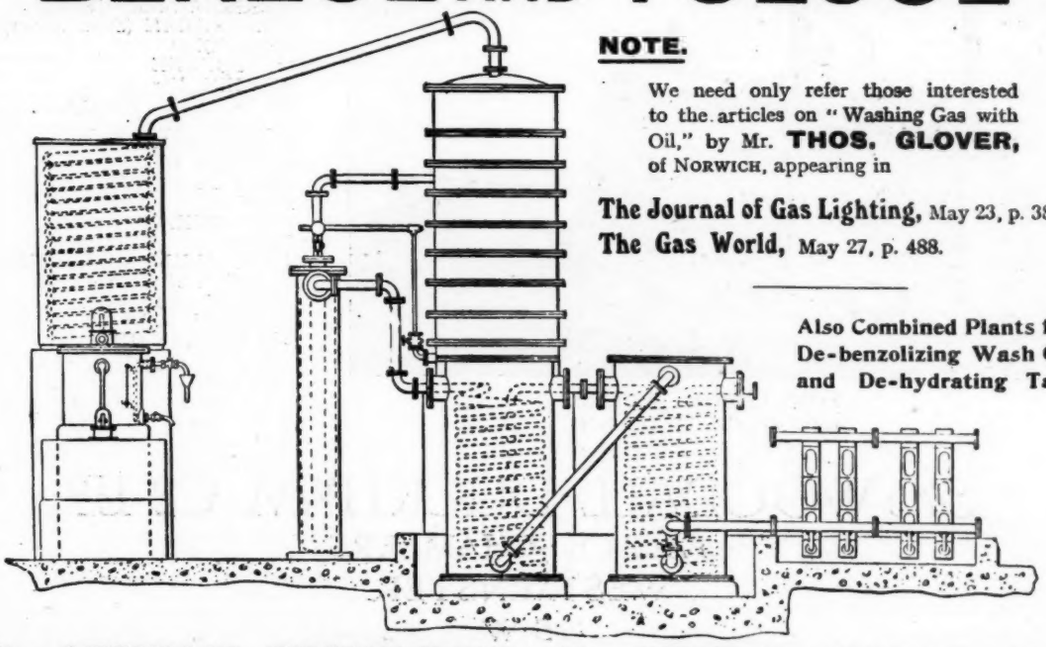
SHOULD INSIST ON

BRITISH MADE

VOLKER MANTLES.

THE VOLKER LIGHTING CORPORATION, Ltd.,
57, Garratt Lane, WANDSWORTH, S.W.

Wilton's Process for the Recovery of BENZOL AND TOLUOL



NOTE.

We need only refer those interested to the articles on "Washing Gas with Oil," by Mr. **THOS. GLOVER,** of NORWICH, appearing in

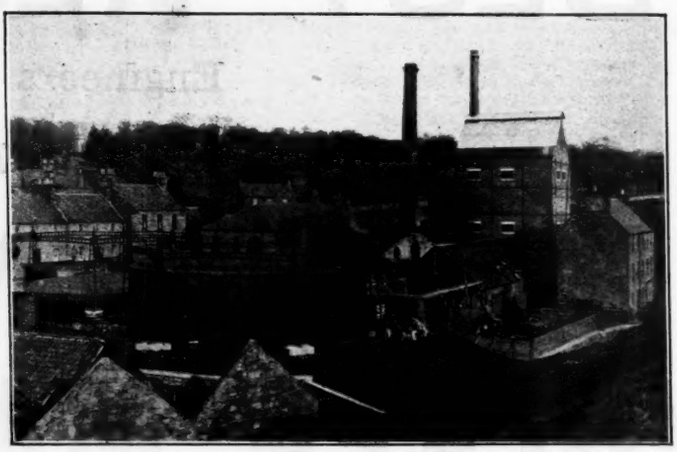
The Journal of Gas Lighting, May 23, p. 387.
The Gas World, May 27, p. 488.

Also Combined Plants for De-benzolizing Wash Oil and De-hydrating Tar.

The CHEMICAL ENGINEERING CO., HENDON, LONDON, N.W.

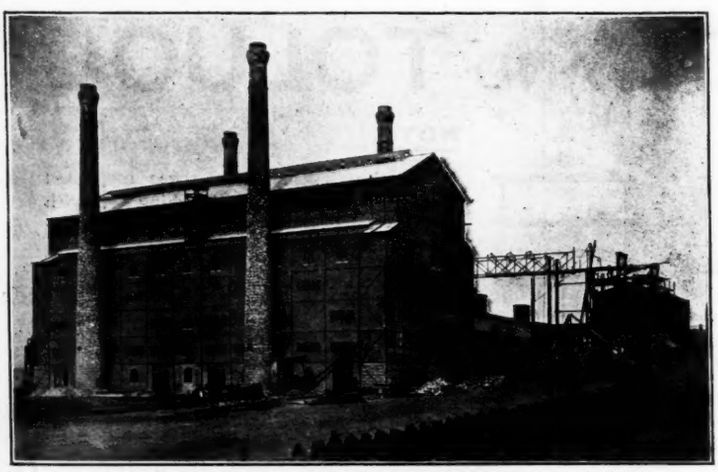
VERTICALS!!

PLANTS ERECTED AND IN COURSE OF ERECTION.



FOR SMALL WORKS.
(FROM 35,000 TO 250,000 CUB. FT. PER DAY.)

BOURNEMOUTH
POOLE
LONDON (Nine Elms)
LONDON (Kensal Green)
BURNLEY
LAUSANNE
LUTON
LA GRANGE, U.S.A.
DRESDEN
IPSWICH, Queensland
POOLE (II)
SMETHWICK
HULL
DERBY, U.S.A.
TOTTENHAM
BUDAPEST
YOKOHAMA
LUTON (II)
BIRMINGHAM (Windsor St.)
BIRMINGHAM (Nechells)
SPALDING
STRANDVEJ, Denmark
HOLYOKE, U.S.A.
BIRKENHEAD
BRISTOL
CLECKHEATON
KINLOCHLEVEN
TOULOUSE
WEST BROMWICH
MARGATE
HYDE
IPSWICH
BOLTON
ABERDEEN
DERBY, U.S.A. (II)
POOLE (III)
SMETHWICK (II)
NICE
WANGANUI, N.Z.
SCHENECTADY, U.S.A.
BROCKTON, U.S.A.
NEW HAVEN, U.S.A.
GREENOCK
AYR
MARSEILLES
MONTBELIARD, France
DUNDEE
ST. ETIENNE, France
SOUTH SHIELDS
WALLASEY
LONDON (Kensal Green) (II)
KENDAL
IRVINE
ROWLEY REGIS
HAMILTON
HARROGATE
TUNIS
BRENTFORD
CANNOCK
PRESCOT
GLOSSOP
WORKINGTON
HULL (II)
NORMANTON
MESSENA SPRINGS, U.S.A.
BIRMINGHAM (Swan Village)
BRADFORD
MELBOURNE
BERGEN, Norway
TRONDHJEM, Norway
ELLESMERE PORT
TOTTENHAM (II)
PORTSEA ISLAND
NEWTON-ON-AYR
FORFAR
NOTTINGHAM
CUPAR
NEWTON-IN-MAKERFIELD
STRANDVEJ Denmark (II)
ODENSE, Denmark
MERIDEN, U.S.A.
MELBOURNE (II)



FOR LARGE WORKS.
(5,000,000 CUB. FT. PER DAY).

The WOODALL-DUCKHAM Co. Ltd.

PALACE · CHAMBERS
WESTMINSTER
S·W

COMMERCIAL GAS COMPANY.

An Ordinary Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The SECRETARY (Mr. F. J. Bradfield) read the notice convening the meeting; and the Directors' report and the statement of accounts for the half year were taken as read.

COAL AND OIL CONTRACTS.

The CHAIRMAN said: It is now my duty to move—"That the report and accounts now submitted (a copy of which has been forwarded to the holders of stock) be received and adopted." There is very little in the accounts which we present to you to-day to indicate the somewhat anxious time through which we have passed in the period which they cover. I have no doubt that you will agree with me, when I go through them with you, that they are, under the circumstances, very satisfactory. The first half of the year is always the more anxious time for the managers of a gas company, because stocks are apt to be getting low, and severe weather is often experienced, and in the first half year we generally make our annual purchases of coal and oil. As a rule, our anxiety is confined to the question of the price at which we can make our purchases; but this year there has been such a shortage in the output of coal, and such a deficiency in tank steamers to transport the oil across the Atlantic, that we have been in doubt whether we should obtain all that we need. At our last meeting in February, I mentioned that we had contracted to buy some coals at a price which was not unsatisfactory; and I hoped then that we should have been able to conclude arrangements for the rest of our year's supply without any trouble. But certain unexpected difficulties arose; and it is only during the last few weeks that we have completed contracts for our necessary supplies for the current twelve months. I need not tell you that we have had to pay very much higher prices than last year. The Price of Coal (Limitation) Act has doubtless had some effect in modifying prices: but it is so difficult to interpret that nobody seems to know what is its real meaning, and coalowners have been enabled to charge almost what they like. I have no complaints to make against the collieries which supply us, and with which we have done business satisfactorily for many years; but I think that the prices ruling in the trade generally are considerably higher than circumstances warrant, although they are probably not as high as the heavy demand from at home and abroad and the shortness of supply would have made them if no restrictions had been imposed. We use, as the accounts show, approximately 200,000 tons of coal a year; and the cost is now just double what it was a few years ago, while oil is costing us three times as much. Nevertheless, the difficulty of obtaining supplies has been so great that we are thankful to know that we have contracts for our full requirements.

TRANSPORT FROM THE NORTH.

But our anxieties are by no means over; for it is one thing to contract to buy coals deliverable in the North of England, and another to get them into the works. Ever since the war commenced, our ships have been subjected to dangers and delays, in so much that, whereas in 1914 four ships, of an aggregate carrying capacity of some 2800 tons, were nearly sufficient to carry all the coals we needed, we have found that, in spite of having bought an extra ship of 1000 tons last year, it was a vital necessity to provide ourselves with further tonnage if we were to avoid the danger of short supplies in the winter months. To charter an extra ship was not only ruinous from the high freightage charged, but we found it practically impossible. We have therefore bought another ship of 1100 tons; and we expect to get delivery of her in September, in time to assist us with the winter supplies. Of course, we have had to pay a price which, before the war, would have been considered preposterous; but we are satisfied that it will pay the Company well to buy her at the price which we have agreed to give. If we were dissatisfied with our bargain, we could sell her again at the present time at a profit. It is a great relief to me to know that we have now secured sufficient tonnage to carry all our requirements even under war conditions. You will be interested to know that two of our ships now carry guns and gunners, supplied by the Admiralty as a defence against attacks by submarines. They have been fitted with the full approval of the crews, who are well pleased to be able to defend themselves in case of attack. We have also applied for a gun for our new ship. Part of the increased cost of coals in the last half year, which I shall have to point out when I come to deal with the accounts, is due to the very much heavier charges of working our ships, which have cost us double the amount per ton of coals that they cost in June, 1914—the last complete half year before the war commenced. This question of the carriage of coals from the North into our works is perhaps the most important before us, because, while we cannot control the price of coal, we have already effected considerable economies in its transport, and I am satisfied that, under normal conditions, we can still further reduce the cost. We labour, as you are aware, under the disadvantage of having only one works upon the Thames, and that (which is situated at Wapping) is the smallest of the three, and can manufacture less than a quarter of our output. It is impossible to extend the Wapping works; and we are constantly trying to devise means of getting our coals cheaply from the Thames to Poplar and Stepney. Thanks to the foresight of Mr. H. E. Jones, who, in years gone by, bought up every piece of ground at Wapping which he could get, we have a considerable river frontage; and it is our aim to develop our wharf there so that we may derive the greatest possible benefit from it.

INCREASED GAS CONSUMPTION AND OUTLETS.

Our sales of gas, in spite of the Summer Time Act, and the restrictions placed on shop and street lighting and the opening of public-houses, show, under the circumstances, a satisfactory increase upon the corresponding period of last year of 18 million cubic feet, which is equivalent to just over 1 per cent. This increase is due to the more extended use of cooking-stoves and gas-fires arising from the high price of coal, and to the demand for industrial (chiefly war) purposes. We have fixed 2534 stoves and fires during the half year. There is little doubt that the increased use of gas stoves and fires will be permanent; for people who have experienced the economy and convenience of gas for these purposes rarely go back to the use of coal.

EXCELLENT WORKING RESULTS.

The working results are in every way excellent, and have contributed in no small degree to the prosperity of the half year. They reflect the highest credit on Mr. Stanley Jones, and those who work under him.

FINANCIAL COMPARISONS.

Now, Gentlemen, we shall find in the accounts as we go through them the few other matters upon which it is desirable that I should comment. The capital account does not call for any remark. The small amount expended was for stoves and services which will go to increase our sales. The revenue account contains matters of greater interest. Comparing the figures with last year's accounts, you will observe that we carbonized 94,410 tons of coal and 1,269,490 gallons of oil, which cost £154 932. In 1915, the figures were 86,253 tons of coal and 1,543,700 gallons of oil, and the cost £113,457—that is, coals and oil, without differing materially in point of quantity, cost more in 1916 by £41,474 than in 1915. This extra expenditure was made up in part by receipts from residual products, which yielded £34,721 more than in 1915. As so often before, coke and sulphate of ammonia have saved us from the necessity of increasing the price of gas. Coke yielded more by £27,095 and sulphate of ammonia more by £6991; the prices obtained being in each case the highest in the history of the Company. The income from gas is more by £16,939—the price charged per 1000 cubic feet being 2s. 8d. for the whole half year, whereas last year it was 2s. 4d. for the first quarter, which, being the winter quarter, yields the best results, and 2s. 8d. for the summer quarter. There was an increase of £231 in meter and stove rents. You will see, on the other side of the account, that the allowances paid to employees absent on war service amount to £2679; but, in addition to this, there is included in other items of expenditure war bonuses—that is, increased wages for the period of the war—amounting to £9388, which makes a total extra sum of £12,067 expended in wages and allowance for the half year. The accounts for June, 1915, contained similar charges amounting to £6375. No less than 241 of our employees have joined His Majesty's forces; and I regret to say that nine have lost their lives. Rates and taxes are less by £4443, due to a decrease in the assessment of the Company's works, and to a credit respecting income-tax. The balance of profit is £68,151, compared with £63,640 last year—an increase of £4511. It is sufficient to pay all interest charges and the full statutory dividend, and to leave a surplus of £8722 to be added to the undivided profit carried forward; bringing it to £87,874. This is briefly the result of the half-year's work; and, in my opinion, and I hope also in yours, it is satisfactory.

A WARNING AS TO THE CURRENT HALF YEAR.

Before I conclude, I must warn you not to expect such good results in the current half year. Our coals and oil will cost us very much more, although, by reason of the balance due to us on the last year's contracts, we shall not feel the full effect of the rise in prices. We cannot expect that the price of our residual products will greatly increase; and in these times we cannot foresee the troubles which may arise especially with regard to the transport of coal in the North Sea and oil in the Atlantic. We have done what we can to provide for the future; and you may rest assured that the Directors, officers, and employees of the Company will do their utmost to ensure a continuance of its present prosperous condition.

The DEPUTY-CHAIRMAN said he had great pleasure in seconding the motion. He should not have added a word; but he was struck by the Chairman's reference to the number of the Company's employees who had gone to join the forces. The proprietors would like to know that, when their Chairman made his speech that day, and gave them his capable, full, and lucid account of the transactions of the Company, he did so under the weight of a great and pressing personal anxiety. Their Chairman had not been without some sacrifice in the war. He had two sons at the front—one of whom was now missing. Another Director was unfortunately in the same position. He was sure the proprietors, as old friends of the Chairman, would not like to leave the room without expressing their deep sympathy with Mr. and Mrs. Bradshaw in the anxiety under which they were labouring.

DISCOUNTS AND ALLOWANCES.

Mr. GEORGE ENNIS remarked that the Chairman had given them his usual explicit explanation of the accounts. There was one item in the revenue account which he could not help noticing. This was discounts and allowances £11,000, which amounted to about 5 per cent. of the gas revenue. The explanation of this item might be very convenient; at any rate, he should like to know how it was arrived at. On the whole, he was well content with the accounts. The fact that they were paying the statutory dividend in these hard times was something upon which the Directors were to be complimented.

The CHAIRMAN, in answer to Mr. Ennis, said, as the proprietors knew, the Company supplied a poor and an industrial district; and they found it absolutely necessary, in order to foster their industrial trade, to give somewhat large discounts. He did not think they were greater than those of other companies. But they were somewhat large; and they were in the aggregate greater in the past half year, because the accounts contained the discounts allowed over the consumption of two winter quarters. This made them appear to be rather considerable. As to the principle on which the discounts and allowances were granted, they only did it to the extent by which they could cheapen the whole supply of gas. That was to say, they never robbed Peter to pay Paul; they would not make the poor or small consumer pay more for his small amount in order to give the large consumer a heavy discount. They took care to only give the large consumer such discount as would enable them to cheapen the whole supply of gas; and therefore give the poor man an indirect benefit. They bore this constantly in mind; and he did not think they had exceeded the very proper limit they had placed upon it.

The motion was unanimously carried.

THE STATUTORY DIVIDENDS.

Proposed by the CHAIRMAN, and seconded by Sir FREDERICK GREEN, dividends were declared at the statutory rates of £4 18s. 8d. per cent.

per annum upon the 4 per cent. stock, and of £4 13s. 4d. per cent. per annum upon the 3½ per cent. stock, both less income-tax.

A Vote of Thanks—Consideration for Workmen.

Moved by Mr. Ennis, and seconded by Mr. R. S. Youngs, a hearty vote of thanks was passed to the Chairman and Directors, officers, staffs, and workmen.

The Chairman thanked the proprietors very much, on behalf of his colleagues and himself, for the very kind resolution. It was a great satisfaction to the Directors to see the proprietors present that day, and to know that they took an interest in the affairs of the Company, and approved of what had been done. He was glad Mr. Ennis included in the vote of thanks the officers and the employees of the Company. He did not think there was a company in which there existed greater harmony and good will than there was between the staff and among the employees of their Company. As he had said before, this was largely due to the popularity and the tact of their General Manager, who was not only a first-rate gas administrator, but was also a first-rate manager of men, and that was a very good quality in a man at the head of a Company such as theirs. He did not think they could be more fortunate than they were in their officers; and he would say right through the staff they had no difficulty or trouble whatever. Mr. Jones had, in the Board-room just previously, alluded to the fact that the Company had given an extra war bonus to the men in common with other companies. But so long as they could make two ends meet, the Directors did not grudge them this. They were glad if they could help them to tide over the high cost of living at the present time. Although the men did not say much to show their gratitude, he believed that deep down, the British workman was grateful for the sympathy and help of his employers.

Mr. Stanley H. Jones (Engineer and General Manager) said he was extremely grateful for the kind remarks that the Chairman had made about his staff and men, as well as in regard to himself. He was a very fortunate man in having to work with colleagues who were men of free thought and action, and so eminent in their own spheres of work that, he was sorry to say, others came along at times and plucked them away. He was pleased to see one was in the room that day [Mr. G. M. Gill], whose pioneer work in the coke business was largely responsible for the fine results in their accounts. Their workmen were a good lot of fellows. He could speak from long and intimate knowledge of them, having served in all the Company's works at different periods in a career extending over twenty years. There was, he thought, something in former associations. He (Mr. Jones) had had a father and a grandfather serving the Company; and this must create attachment. The Chairman himself had been preceded by his father and grandfather. He was confident that, more especially in times like the present, there was something in such associations, which deepened one's interests.

Mr. Bradfield, on behalf of the clerical staff, thanked the proprietors for this renewal of their confidence. It had been his custom to speak at these meetings of the work of the societies which were instituted for the benefit of the workmen. A year ago he referred to the very bad time they were having in regard to sickness. He was pleased to inform the proprietors that since June last year, this had completely changed round; and the men were now having better health.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

The Half-Yearly Ordinary General Meeting of the Company was held last Tuesday, at the Westminster Palace Hotel, Victoria Street, S.W.—Mr. H. E. Jones, M.Inst.C.E., in the chair.

The Secretary (Mr. Chas. W. Braine) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

Salient Features of the Report—Reduction in Price.

The Chairman said it became his duty, and it was as pleasant as any duty could be, to move the reception and adoption of the report and the statement of accounts. It would be seen from the report that the revenue showed a profit in excess of the dividend by £4086. This would not be "excess profits," because even at that they were below the average that was due to them. The dividend recommended was at the full amount under the sliding-scale. The proprietors were also informed by the report that the sale of gas had increased by nearly 2 per cent.—or, to be exact, 1·97 per cent.—for the half year, which was very satisfactory. There was an increase in the number of the consumers of 370, and in stoves at rental 1253—that was to say, four times as many stoves had gone out as they had extra consumers, which showed that the old consumers were availing themselves of stoves. The cream of the report was that the Directors were able to announce a reduction of 1d. per 1000 cubic feet over the whole area of supply from the taking of the indices at Midsummer last. A penny might not appear to be much; but then it must be remembered that the price of their gas was not much either. They supplied the cheapest gas round about; and, of course, those companies who had fat prices could make fat reductions. At their own price, they could not afford to do this. However, the reduction was satisfactory as showing that, after climbing the hill, they were now beginning to go down. Those who were conversant with the Directors, as the proprietors were, would be aware that they had not arrived at any hasty or precipitate conclusion in this particular. They expected to realize in the coming period certain economies, which, of course, might be upset by the turn of the war; but, as far as human foresight went, they ought to easily make this reduction to the consumers. Whether the proprietors would get the extra ½, or 2s. 6d., per cent. upon their dividends remained to be seen. They must "wait and see;" but they might be very confident that poor men like the Directors, who were all considerable stockholders [Laughter], would do their level-best to get the dividend to which they and the other proprietors were entitled under the sliding-scale, and more of which could not be realized without the price of gas was further reduced.

Cooking-stoves necessitate expenditure on large mains.

The next point was the capital account. There the proprietors would see a small expenditure for land, £235. But a very large sum had been spent upon meters and stoves, which was accounted for by the paragraph in the report showing, as he had already pointed out, that they had connected-up more stoves than extra consumers; and thereby hung a tale. Owing to the Treasury limitations to the issue of capital, the Company were at the outbreak of the war arrested in connecting-up a large main between Wandsworth and Wimbledon. That was very proper. The Directors did not want to spend any more money than was really necessary; but they did not like to deny the consumers—the slot-meter ones especially—who were feeling the high price of coal, the stoves for which they asked. They seemed, indeed, to be more anxious about getting stoves than in the previous history of the Company; and the Company went on putting in the stoves without exactly realizing what might happen. And the time came when they found that, if they did not lay a main to feed these stoves, they would find themselves in a hole. The people who had the stoves in the district in question experienced some difficulty in cooking their food, in spite of the fact that the Company put on pressures that were enough to make the old class of gas engineers rise in their graves in apprehension. However, there was nothing for it but to proceed in defiance of the Treasury restriction. So they had started in this year 1916—this bad year, clouded by war—to lay about 1½ miles of large main (24 inches diameter), which would have to be paid for somehow or other, but which would have the effect of feeding these stoves which were day by day accreting in a remote part of the district. The Directors were not going to let a market go by for want of serving it.

Capital and Movable Property.

Therefore, the position was that the expenditure of capital was all on what might be called the movable part of their property—meters, stoves, waggons, motors, and barges. The Company had a considerable transport department, which was not a common element in gas companies' capital. They happened to have the lowest capital per unit of gas sold of any company in or round about London. Yet their capital comprehended a lot of things in the way of ships and barges which other gas companies had not got; and when they came to buy them, they would find their capital a great deal bigger in proportion than the Wandsworth Company had that day. The amount added to capital in the half year was less than £5000—£4917—upon the past expenditure of £959,956; so the proprietors would see the Directors were not running away with capital, though they were providing the homes of working men with cooking appliances.

War Expenditure, and the Gallant Little "Wandle."

Turning to the revenue account, the profit for the half year gave them a small surplus, after meeting capital charges, of £4000. In recent half years, they had been drawing upon their reserves in much larger amounts than they had had to do in previous half years. So that it was very satisfactory to again have a surplus. Just above the half-year's profit would be seen an interesting group of items that were headed "War." These items were: Dependants of employees on active service, £2032; food bonus, £6491; and discounts (£117) on the accounts for gas where Belgian refugees were stationed. He thought they would agree with him that these poor people should have the consideration of cheap gas, after all they had done for this nation. Then there was an item "s.s. *Wandle*, £250." Probably the proprietors would ask what this was. He had no doubt they had seen something regarding it in the papers. The policy of the Company had been to have a little fleet of three colliers for the purpose of evading the enormous freights that other companies had been paying. The Directors asked the Admiralty to give these colliers guns and gunners; but, in the early stages of the war, they had not these things to spare. Eventually the Admiralty did put a gun and gunners on the *Wandle;* and this happened to be the one of the three colliers that encountered a submarine. Shots were exchanged; the submarine was damaged, and had to sink. Whether or not it went to the bottom, he could not say; but he devoutly hoped so—the murderous crew. The *Wandle* and her captain, gunners, and crew were saved, and so was the cargo—about 1200 tons of coal, which cost something like £600 less in that boat than if they had chartered an outside steamer at the preposterous rates that had been charged the last two years. The Directors came to the conclusion that they would signalize this victory of the *Wandle* by giving the gallant captain, the gunners, and the crew a bonus of £250; and he was sure every proprietor would hold up both hands in support of that action. ["Hear, hear."] He thought the proprietors would say that; and he was much obliged to them. It was a wise and a proper thing to do. It was a right thing, too, to have had their collier armed with a gun, for it saved a second and much larger ship—a 5000 ton one—from the scoundrel submarine that left it to attack the *Wandle*, with the result that it lost both prizes. The *Wandle* had had its lifeboat shot away, and the only boat left to her was the shore boat; so that, the captain and crew having been deprived of all means of escape, it became necessary for them to fight for their lives. When the £250 was handed to the captain, after thanking the Company for it on behalf of himself, the gunners, and the crew, he said: "I thank you for that gun. If it had not been for it, we should not have been here, and your ship would have been at the bottom of the North Sea." That would have been extremely inconvenient to the Company. When he told the proprietors of the trouble their Engineer had to purchase a third steamer after war broke out, and of the great anxiety and cost, they would realize that the Company would have been in a grievous hole if they had lost the services of the *Wandle* and her gallant Captain and crew. As the Captain said: "When the submarine shot away my lifeboat, it became a matter of life and death." Since this affair, the Admiralty had seen fit to arm the other two boats; and so the Company were now the proud owners of a little fleet of war vessels. He not only congratulated the proprietors upon this, but upon the sum of £8891 that they had paid in the half year for war purposes—for, among other things, supporting the dependants of their brave employee soldiers. They had

contributed no less than 33 per cent. of their employees to the forces on active service. There was the food bonus, to make their men and families comfortable in spite of the war. These charges were a matter for pride, because £8891 was a very large sum in one half year. It was equal to one-fifth of the gross profit—that was to say, the profit would have been one-fifth more, but for this wretched, unnecessary, and (by the Germans) wickedly conducted war.

INCREASED COSTS, AND THE REVENUE FROM RESIDUALS.

He would go back in order to refer to the means by which they had made their profit. Coal had cost £24,000 more in the half year than in the corresponding half. The high price of labour and materials made the wear and tear and renewal of the plant on the works some £6000 more. Altogether on manufacture of gas some £28,000 more had been spent. Repairs, maintenance, and renewals of mains and service-pipes came out about £2400 less. He wished it had not done so; he wished they had laid the larger main before the poor people had the stoves put in. But the consumers only suffered actual inconvenience for one day; and as soon as the information reached headquarters, the resolve was taken to put it right. Against the £28,000 increase in manufacturing costs, residuals came to the rescue, and gave them an additional £26,000—nearly putting them straight. This was really the whole story of the accounts.

RESIDUALS DEVELOPMENTS.

Residuals were now being used largely for war purposes. The proprietors might think the Company were making large profits from them; but the increase in the sale of tar was only £1400 out of £8000. This was not derived from the war; but from the tar they were making of better value for road purposes. An advantage did accrue from this. Ammonia was £4600 more. This came from the scarcity of freights of nitrate of soda to this country; and consequently the farmers were using more sulphate of ammonia, which was always worth £3 or £4 per ton more than nitrate of soda, owing to its own inherent merit. He believed that the farmers, profiting by necessity, would learn that the war had been of value to them in this connection. Then they had constructed plant for furnishing the War Office with some additional benzol and toluol. The Company had this plant running; but the War Office took the products at their own price. At the present moment, the Company saw no profit from this source. The Directors did not look for profit. What they said was: "We are going to help in this way in the defence of our rights and properties." Besides this, they were making shells and fuses. Their Engineer (Mr. Carr) was working for Lord Moulton and the High Explosives Department; and he went round the South of England on tours of inspection in connection with the production of benzol and toluol. He (Mr. Jones) was a member of Mr. Lloyd George's Munitions Committee. In these ways, they were all doing their best.

THE PROFIT-SHARING BONUS.

As to the profit sharing, the charge this half year was £1950. When he looked at the valuable analysis of various gas companies' accounts, which Mr. Bradfield, the Secretary of the Commercial Gas Company, prepared, and which were published in that day's issue of the "JOURNAL OF GAS LIGHTING," he found that the profit sharing of the Company ran out to a larger charge per 1000 cubic feet of gas sold than any of the other companies, but one. It cost them 0·36d. per 1000 cubic feet of gas sold. There was no other company this touched this, except the Tottenham Company, whose charge was 0·43d. Most of them were in the neighbourhood of 0·3d. or 0·28d. The reduction in the price of gas by 1d. would encourage the men, through the small addition it would make to the bonus; it would encourage them to try and get another penny off, and so improve not only their position, but that of the consumers and relatively that of the proprietors.

WORKING-UP RESIDUALS AT HOME.

Reverting to the work that was being done for the War Office, he said it rather led the Board to think that it would be wise to extend their own processes of dealing with residual products, and not be dependent upon manufacturers at a distance, nor have to pay carriage on the raw material, which cost had to be paid by the consumer, besides which on the products made from the raw materials the purchasers had to pay a large profit. Some of these residual materials of gas manufacture had been worked-up in Germany, and had helped to furnish the enemy with high explosives for the war. This country had been late in the day in utilizing these raw materials, instead of allowing them to go to Germany. The Germans were the pioneers in their use; and there was no doubt this country was very badly situated when the war started, in that the War Office should have known a little more about these things at an earlier stage. If this had been the case, gas-works could years ago have furnished the substances required; and a good stock could have been accumulated. At any rate, the Directors were satisfied that, being the producers of these materials, they were the proper people to develop them, and not outside contractors, who might be Germans. However, they were now going to do for themselves what others had been doing for them. They were going to have not only the profit, but the control of the business.

The DEPUTY-CHAIRMAN (Mr. R. Garraway Rice) seconded the motion.

Mr. L. ANDREWS said he should like to congratulate the Chairman and Directors upon the balance-sheet. The most captious critic could not find fault with it. He believed he was right in saying that, at this time last year, in order to pay the dividend, the Directors had to take £5000 from the reserve fund. This was a large amount; and he presumed that it would be gradually paid back as the 1d. reduction got to 2d., and so on. All the proprietors were delighted to find the Wandsworth Company were able to reduce their price by 1d. The South Metropolitan Company were lowering theirs by 2d.; but he did not think the Wandsworth Company ever put on so much as their neighbours. As to the *Wandle*, the proprietors all appreciated thoroughly what the Captain, the gunners, and the crew did when attacked by one of the enemy's submarines.

The CHAIRMAN: We raised the price of the gas by 4d. only.

The motion was unanimously carried.

THE DIVIDENDS.

Proposed by the CHAIRMAN, and seconded by the DEPUTY-CHAIRMAN, dividends were declared at the statutory rates per annum as follows: £7 17s. 6d. per cent. on the Wandsworth "A" stock, £6 7s. 6d. per cent. on the Wandsworth "B" stock, £5 10s. 3d. per cent. on the Wandsworth "C" stock, £5 15s. on the Wimbledon stock, £6 7s. 6d. on the Epsom stock, and £5 10s. 3d. on the new ordinary stock.

VOTES OF THANKS.

Mr. GEORGE ENNIS remarked that the address they had heard from the Chairman had been full of interesting particulars. He entirely approved of what had been done with regard to the Captain, gunners, and crew of the *Wandle*. As to the affairs of the Company, he thought the Chairman and Directors were pursuing a conservative and progressive policy of a distinctly beneficial type. The reduction of 1d. in the price of gas was in these times a bold step in the right direction. He moved that a very hearty vote of thanks be given to the Chairman and Directors, the officers, their staffs, and the workmen.

Mr. SAMSON seconded the motion, which was cordially passed.

ENGINEERS OR CONTRACTORS' AGENTS.

The CHAIRMAN, on behalf of his colleagues and himself, thanked those who had spoken for the kind things they had uttered, and the proprietors generally for their endorsement. Discriminating approval was always better than approval of a less searching character. He should ask the chief officers to return thanks on behalf of themselves, their staffs, and the employees. Their men had been working admirably through all the severe contingencies which had assailed them through the war. When a Company lost 33 per cent. of its operatives, it followed that the remaining 66 per cent. had to work without the practised and skilful assistance that they had previously had; and in many cases they had been doing a good deal of the work that the other 33 per cent. had been performing. He should like to say that nothing could be more gratifying than the spirit and the good will displayed by their men, who, by helping to make explosives and shells, had been doing their "bit" for the common end. That there was great value in this service was conveyed by the fact that, though the enlisting officer got hold of a good many of their men, one of them—a mechanic employed at Wandsworth in an important part of the chemical work, was told that he must go back. Dr. Addison mentioned at one of the meetings of the Munitions Committee, that they were doing no service to the country if they let any mechanic who could turn out a good shell go away to the trenches. It had even been suggested that some of those who had gone away to the trenches should be brought home again. But a good mechanic and a good engineer was a good man all round; and the commanding officers would not part with them. As to the officers, Mr. Braine was a very old hand; and they all knew how precisely he did his work. In Mr. Carr, they had a most capable engineer of the greatest ability. He was one of his (the Chairman's) own pupils; and he did the best possible work. He was working double time; for he was working for Lord Moulton's Committee, as well as carrying on the Company's work. He had a great deal of work to do. He was a thorough engineer, and not a contractor's agent, such as they were now told in one of the technical papers should be admitted to their technical organization. He (the Chairman) thought it a pity such a statement had been made. Mr. Carr was independent of any contractor's corruption. It had been suggested lately that it would be just as well if the Corrupt Practices Act were mixed up with the proceedings of gas engineers. It was a most melancholy thing that these criticisms were made in public. Mr. Carr was a most honest gentleman, and a most capable engineer; and he had done a great deal to bring the Company up to this successful issue.

Mr. BRAINE, acknowledging the vote on behalf of his staff and himself, said that naturally the war had caused them work; but they, like Englishmen, had adapted themselves to it. Everyone was doing his best. Although 33 per cent. of the workmen had gone, no less than 80 per cent. of the office staff had also gone; and he thought the accounts showed that those who remained were keeping at the work.

The CHAIRMAN: But you have some nice ladies working for you.

Mr. CARR, in his acknowledgment, said he could assure the proprietors that the staff and workmen had the Company's interests thoroughly at heart. All the co-partners were exceptionally pleased that the price of gas had been reduced by 1d. For the handsome remarks the Chairman had made regarding himself, he thanked him very much.

PORTSEA ISLAND GAS LIGHT COMPANY.

The Half-Yearly Meeting of the Company was held at the Chief Offices, last Thursday afternoon—Mr. ROBERT EDGCOMBE HELLYER presiding.

The CHAIRMAN, in proposing the adoption of the report and accounts [*ante*, p. 311], first commented on the many and increasing difficulties created by the war—in particular, the transport by both sea and rail of coal and oil, and the serious shortage of labour. Nearly 300 employees, he said, had been released for military service; and though a number of other men had been obtained, being inexperienced, they were naturally unable to perform the work with the same efficiency. He stated that last winter, and in the early part of the present year, owing to the shortage of coal and oil, it had been necessary to reduce the pressure of gas in all parts of the district; and a very considerable number of complaints were received from consumers, especially from those who relied on gas for cooking and heating purposes. He was glad to say, however, that, thanks largely to the assistance received from the Admiralty and the War Office, and particularly from the local officials in these Departments, for some time past ample supplies had been received, which had not only permitted of the normal pressure being resumed, but had enabled the Company to create moderate reserves for the winter's requirements. If present conditions prevailed, the Directors would be able to maintain a thoroughly efficient service without further interruption. Dealing with the accounts, he drew attention to the fact that the coal had cost no less than £13,700 more during the half year. The current contracts showed an increase

of 8s. 8d. and 6s. 8d. per ton for sea-borne and rail-borne coal respectively; and oil had increased from 2 15/16d. to 5 13/16d. per gallon. In the matter of oil, however, he thought the Company might consider themselves fortunate, as he had read of at least one company paying no less than 10d. per gallon. Several of the other items of expenditure showed a considerable increase, due to the higher cost of all materials and labour; but against these, the Directors had been able to economize in several directions, without in the least neglecting the upkeep of the works or plant, and with due regard to the general interests of the Company. Sales of gas produced £11,000 additional receipts, and residuals £3700; the latter being due to improved prices, and the former to the increase of 4d. per 1000 cubic feet in the price, which the Directors had been compelled to make as from the last December quarter. In this connection, the Chairman remarked that, in view of the large increased cost of production, it was obviously impossible to continue to supply gas at pre-war prices; and it was a matter for congratulation that the Company had been able to do so for eighteen months under war conditions. The net result of the half-year's working permitted of £4000 being transferred to the extraordinary renewals account; and after paying the statutory dividend, the carry-forward would be increased by about £500, which, having regard to the conditions, he thought was highly satisfactory. Referring to the Gas (Standard of Calorific Power) Act, which provides a simple and inexpensive means for obtaining the substitution of a calorific standard for the present illuminating power standard of gas, he expressed the opinion that in the interests of the consumers and of the Company the change would be most desirable. The Directors had the matter under consideration, but had not yet come to any decision. For a considerable time past, the Engineer (Mr. J. D. Ashworth) had been conducting experiments for the extraction of benzol and toluol. Difficulties which had been experienced had been overcome, and plant was now being installed for extracting these substances, which would be at the disposal of the Government during the war, and would afterwards, no doubt, be of considerable value for industrial purposes.

The report was adopted, and the statutory dividend declared; the meeting terminating with a vote of thanks to the Chairman and Directors, the Engineer and General Manager, the Secretary (Mr. H. A. Stibbs), and the staff generally, for their conduct of the Company's affairs.

PRIMITIVA GAS COMPANY.

The following letter, regarding this Company's financial affairs, has been communicated to the Press.

Sir,—In his message to Congress on May 30 last, the President of the Argentine Republic made the following statement with regard to the Municipality of Buenos Ayres: "The municipal government of the capital in the past year presents a pleasing picture of order, foresight, and administrative morality."

In his speech at the annual meeting of the Primitiva Gas Company of Buenos Ayres, held on April 18, the Chairman said: "The Municipality has been in grave financial difficulties—at least, we imagine so, because they have not been able to pay us for the public lighting for more than a year . . . and it is quite evident we cannot go on with this public lighting unless we are paid a large amount in cash. . . . We, after long negotiations, obtained six months' Municipal Treasury Bills for about £100,000; but, unfortunately, these bills were not met at maturity. . . . In addition to the £100,000, we have owing to us by the Municipality a further sum of £28,984 to the end of the year for public lighting. Since that, further amounts have accrued up to date, none of which have been paid. . . . Another bad feature is that the authorities have forced us to pay the tax, which is payable quarterly, of 10 per cent. on the gas sold. . . . Though they do not pay us a cent for lighting, we have been obliged to pay this tax."

The Municipality owes the Company £150,000 for gas supplied, and does not meet the bills it gave in partial payment of its debt. How the President can consider that this state of things presents a "pleasing picture" of order, foresight, and, above all, of administrative morality, quite passes my comprehension.

E. BRAITHWAITE SAVORY.

Basildon House, E.C., Aug. 18, 1916.

Gas-Making Likely to Cease at Midsomer Norton.—At last week's meeting of the Midsomer Norton Urban District Council a letter was read from Mr. A. E. Maggs, the Secretary to the Gas Company, asking the Council to postpone the sealing of the contract for the lighting of the street-lamps. The Local Tribunal had refused exemption to one of their gas-makers; and should the decision be confirmed on appeal, the Company would be unable to supply gas as usual. Gas-making must be continuous, and the only remaining gas-maker could not work night and day. The Clerk pointed out that, with the Reduced Lighting Order, if the agreement was signed it could not be put in force. The terms were opposed to the Defence of the Realm Act. It was agreed to allow the matter to stand in abeyance for the present.

Herne Bay Water-Works Company.—The shareholders met last Tuesday, at the London Offices, 38, Parliament Street, S.W., when Mr. A. Telford Simpson, from the chair, was able to report that the income for the six months to June 30, after making provision for empty houses, irrecoverable rates, &c., amounted to £2838, and the expenditure £1504. Including the amount brought forward from the last account, there was £1928 available for interest and dividend on the preference and ordinary stocks. It was recommended to pay a dividend on the 6 per cent. preference stock equal to £524, and at the rate of 4 per cent. per annum on the ordinary stock. This would leave a balance to be carried forward of £482. Having regard to the excess expenditure on revenue account for the past half year, which was heavier than formerly—mainly through the high cost of fuel, wages, &c., owing to the war, also the large amount for allowances for empty houses, rates, &c.—the Directors thought it prudent to reduce the dividend for the time being on the ordinary stock of the Company to 4 per cent. per annum.

STOCKPORT AND ITS GAS SUPPLY.

The Engineer's and Manager's Report for Last Year.

A fortnight ago [p. 267], a notice appeared of the proceedings at the meeting of the Stockport Corporation when the annual statement prepared by the Gas Engineer (Mr. S. Meunier) was submitted and approved. A copy of the text of Mr. Meunier's report has since come to hand, and a few extracts from it may now be given.

After referring to the current prices of coal and oil, Mr. Meunier says: As is almost invariably found, the increase in price of 6d. per 1000 cubic feet, which commenced in the September quarter of 1915, only brought in additional revenue to the extent of about 3¾d. per 1000, which would only be slightly increased by the sales for the June quarter, 1915—consumers naturally seeking to economize as much as possible on their consumption. In addition, the quantity used for industrial purposes was reduced by the decrease in discounts allowed of no less than £1846.

The increase in revenue from ordinary gas consumers was £11,844; and after deducting the loss on public lighting—viz., £3139—the net increase was £8705.

Coke, due to the increased price though on a diminished sale of 1637 tons, realized an additional £3130; tar, a loss of £569, due almost entirely to further reductions in the value of pitch; while ammoniacal liquor was responsible for an addition to the revenue of £1550.

The war benefited the Department greatly in one item, as, owing to the Government requirements of sulphuric acid, it was enabled to obtain the highest price for its spent oxide it has ever touched in its history—this being 1s. 1d. per unit of sulphur, as against the pre-war price of 3¼d., so realizing £2845, against £487, or an increase of £2358.

On the expenditure side, coal cost £4692; cartage, &c., £358; carbonizing wages, £734; and purifying, £370 extra—the latter item due to the increased quantity of carburetted water gas made, for the manufacture of which the oil cost £3162, coke £456, and wages £74, over last year. Maintenance of works was reduced by £115, and distribution by £680. There was also a reduction in management charges generally; but an increase to dependants and employees on joining H.M. Forces—from £582 to £1384. Rent, rates, and taxes increased by £2251, of which £1884 was on taxes alone. The gross profits were £32,813, against £28,927, or an increase of £3886.

The make per ton was the lowest recorded for a number of years, and could only be partly accounted for, unfortunately, by difficulties in regard to obtaining adequate labour for the retort-house, and irregularity in the attendance of some of the men. On many occasions, Mr. Meunier remarks, retorts had to be laid off for one or more shifts at week-ends, which had not only a material effect on the quantity of gas obtained per ton of coal, but also left the retorts themselves in such a leaky condition, due to constant heating-up and cooling down action, that, when again put to work, a large amount of gas was lost till the leaks could be pointed up again. This had to be particularly and constantly attended to practically speaking throughout the whole of last winter.

Another item was the apparently great increase in the unaccounted-for gas; but this is "more apparent than real." From Oct. 12 to Dec. 1 the station meter was under repair; it having stopped working by reason of a serious leakage in one of the four partitions of i s drum, and a minor one in another. Thus for a portion of the time of heaviest production, the daily make of gas from the retort-house had to be estimated, "a fact of which it is feared advantage was taken by some of the stokers in not putting the full weights of coal arranged for and entered in the daily register, into the retorts." The meter being out of action, and it being necessary to estimate the make per ton, this was taken at a figure based on what had obtained during the earlier portion of the year; and "the daily make and consumption thereby recorded was undoubtedly higher than the actual amount made." This was discovered on the meter being put to work again, and steps were taken to find the causes and have them remedied as quickly as possible.

The sulphate of ammonia plant has now been completed, but not yet put to work—due to the fact that so far it has not been found possible to obtain sulphuric acid. The Explosives Department have suggested some additions to the plant which will enable the ammoniacal liquor to be in future highly concentrated. They have offered terms for the purchase of this, and also for defraying a percentage of the cost of installation, dependent upon the amount of output and capacity of the plant, which, after the war, would become the property of the Corporation. These additions would, Mr. Meunier points out, be a distinct advantage, as the Department would afterwards be in a position to dispose of its ammoniacal liquor either in the form of concentrate or sulphate as circumstances or markets justified.

The question of obtaining sufficient and suitable retort-house labour for the forthcoming winter is, the concluding paragraph of the report mentions, a very grave one. Last year, there were not enough hands obtainable to man the number of retorts available, and the carburetted water-gas plant had to be fallen back upon. This year, if oil cannot be bought, the assistance of the Government will have to be obtained in some way or other, or the supply of gas curtailed. The British Commercial Gas Association, particularly, have for some time been in touch by correspondence and interviews with the Labour Department of the Ministry of Munitions on this matter, and are still maintaining their efforts; while the local Labour Exchanges and the Manchester Branch of the Ministry of Munitions (Labour Department) have been approached on the matter directly by this Department. It is hoped to obtain sufficient suitable men, either trained or who can be trained, to enable the works to tide-over the heaviest portion of the year.

Barnsley Gas Company.—Out of a profit made last year of £7495, the Directors recommend that, in addition to the interim dividend paid in March, a further dividend shall be paid on Sept. 1 of 5 per cent. on the general capital stock and "F" shares, 3 per cent. on the "C" (preference) shares, and 3½ per cent. on other classes of shares, less income-tax in each case.

ST. LOUIS GAS-RATE SCHEDULE.

A New System Adopted.

A new method of gas-rate charge, known as the "group block" system, has been adopted, and been made operative, by the Laclede Gas Light Company, of St. Louis. It is a scheme which has been developed by Mr. Henry I. Lea, of Chicago; and its basis and working are explained in an article contributed by Mr. Walter V. Turner to the "Gas Record" of that city.

Under the "group block" rate, the charge made to a given consumer for a given volume of gas is determined by the investment required by the consumer and by the load factor of the group of which the consumer is a part, as well as by the volume of gas consumed. The consumer is not asked to pay any fixed charge as such. The same purpose is achieved by increasing the volume which must be used at the initial rate in accordance with the investment required, after having given credit for the load factor of the consumer. This "initial volume" is defined as the volume of gas which a given consumer must use at the initial rate before he will have paid his proper share of all operating expenses, replacement annuities, and net earnings. While there always will be some consumers who fail to use their respective initial volumes, it will be impossible under the "group block" rate for any consumer to obtain an average price lower than the initial rate until he has fully earned the right to such reduction.

Because, says Mr. Turner, there will always be some consumers who fail to use their respective initial volumes, and consequently fail to pay their respective shares of expense and earnings, there must still be imposed upon those who have already paid their shares an additional burden. Under the "group block" rate, this is done by providing a "secondary volume." This secondary volume, while sold at less than the initial volume, is still sold at a price sufficiently above the output cost to cover the burden imposed by those consumers who fail to use their respective initial volumes. Thus, when a given consumer has used his initial volume at the initial rate and his secondary volume at the secondary rate, he will have paid his proper share of all expenses and earnings, *plus* his proper share of the burden imposed by the unprofitable consumers, and therefore will be entitled to all additional gas at a price representing only a reasonable margin above output cost.

The new "group block" rate adopted in St. Louis is as follows:

Charge for Gas Used through One Meter in One Month:

Initial volume at	$0·75 net per 1000 cubic feet.
Secondary volume at	0·55 " " "
All additional at	0·45 " " "

Capacity Required Per Hour (Cubic Feet).	Size of Meter Used.	Minimum Bill Per Meter Per Month.	Initial Volume (Cubic Feet).	Secondary Volume (Cubic Feet).
0—200	5 Lt. Ord. 10 Lt. Ord. 5 Lt. "B"	$0·50	7,800	6,800
200—800	20 Lt. Ord. 30 Lt. Ord. 10 Lt. "B" 45 Lt. Ord. 60 Lt. Ord. 30 Lt. "B" 80 Lt. Ord. 100 Lt. Ord.	0·50	11,100	6,800
800—2000	150 Lt. Ord. 60 Lt. "B" 200 Lt. Ord. 250 Lt. Ord. 100 Lt. "B"	0·50	20,300	6,800
2000—3000	150 Lt. "A"	0·50	37,400	6,800

Examination of the schedule will show that the consumer who makes a demand of less than 200 cubic feet per hour upon the capacity of the company must use only 7800 cubic feet at 75 c. net per 1000 feet before he is entitled to the secondary volume of 6800 cubic feet at 55 c. For all additional gas consumed, he will be charged at the rate of 45 c. As the demand upon made upon the capacity of the company increases, so also does the initial volume increase, until the consumer whose demand is between 2000 and 3000 cubic feet per hour must use an initial volume of 37,400 cubic feet at 75 c. net before he is entitled to the secondary volume at the 55 c. rate. This means that the consumer who requires less than 200 cubic feet per hour, and who uses 7800 cubic feet per month at 75 c. per 1000 feet, is relatively as desirable a consumer as one who requires a capacity of from 2000 to 3000 cubic feet per hour, and uses during the month 37,400 cubic feet at 75 c. In each case the company will be receiving the same net earnings per dollar of investment required; and consequently the consumers at these points should receive equal rates.

This, it is believed, is the first form of gas-rate schedule under which it is possible for the consumer of small demand to obtain as low an average price as he has actually earned. A little thought will show that volume alone cannot properly constitute the basis of charge. The volume of gas used is but one of the considerations; and it must be treated in connection with the demand upon the investment of the company which the consumer makes, and in connection with the extent to which the consumer uses the capacity he requires. Under the "group block" rate, these factors are all given their proper weights. Under this schedule, as nearly as it may be worked out in practice, each consumer gets a reduction below the 75 c. rate as soon as he has earned it, and not before. This does not mean that the user of large volume will be unable to get a low average price, for he will be able to get as low an average price as is open to any other consumer, provided he uses that volume of gas which is required under his particular conditions of demand and load factor to justify such low average price.

This new schedule applies to all consumers in the city of St. Louis and to gas used for all purposes, with the single exception of street lighting, which is covered by a separate contract. Therefore, the company will not be subject to attacks for charging different prices for different uses of gas when other factors are equal. It is believed that this form of schedule is economically sound throughout, as it has withstood searching examination by competent gas officials, city officials, and the State Commission, and has been approved throughout.

THE REALLY "BRITISH MANNESMANN" COMPANY.

Under this heading, the "Cambrian" of last Friday's date said; "Some weeks ago a statement appeared in our columns regarding a probable transfer of the controlling interest in the Mannesmann Tube Company to Messrs. Baldwin's, who, it is understood, were willing to purchase what is a phenomenally successful undertaking. Developments, however, have since occurred, we understand, which give promise of a large Scotch undertaking taking over the interests; and, further, we understand the matter is ended so far as Messrs. Baldwin's are concerned. Inquiries at the Landore works elicit that nothing is known of the matter."

History of the Brothers Mannesmann.

In a recent issue of the "Iron and Coal Trades Review" there was a history of the Brothers Mannesmann, the German firm who established great tube works at Swansea, and who were about to spend £800,000 on a works at Newport when war broke out. Their family introduced the first steam plant into Germany, and their father left his six sons (one of whom is dead) a file works at Reonscheil. The five brothers built the Swansea works, which they left under the management of Mr. Kohn, who lived at Gwydr Gardens, and who was interned during the first weeks of the war. One of the brothers, Otto, invented the incandescent lamp; another invented the Mannesmann boot, which has a separate compartment for each toe; another spent his time doing diplomatic work for the firm at Madrid. But their boldest adventure occurred in Morocco. Reinhard, Max, and Alfred travelled all over the hinterland of Morocco prospecting for minerals. It was a dangerous enterprise, and Alfred was captured by the Pretender El Hiba and held to ransom. When his ransom had been paid, Alfred and his brothers began to develop cotton plantations, while another of their enterprises was a wool-growing farm on the slopes of the Atlas Mountains. Then they discovered iron deposits in Morocco; and it was the concession granted them by the Sultan for a payment of £130,000 that led to the Agadir incident, when the Kaiser sent a cruiser to "protect German interests." The activities of these brothers are described as the most wonderful instance of family co-ordination in modern times.

EFFECTS OF TRI-NITRO-TOLUENE ON WOMEN WORKERS.

[From the "Lancet," Aug. 12.]

It would be surprising if the constant handling of a nitro-compound were not without some injurious effect upon the health of a proportion of workers. But as a very careful investigation shows, the toxic symptoms here and there manifested are not widespread, and, moreover, can with suitable precautions be avoided; while in the majority of cases they yield to treatment.

It has been well established that the chances of risk to health involved in the conduct of more or less poisonous trades can be minimized by the factory hands if they will adopt the precautionary measures laid down by the Home Office authorities; while this same department is insistent, as a rule, on the provision of ventilation and all appliances needed to keep down or remove dust or gases in those industries in which they may arise. Dr. Agnes Livingstone-Learmonth and Dr. Barbara Martin Cunningham, women medical officers in the munition factories, point out that in the tri-nitro-toluene filling sheds the work necessitates intimate handling of the powder; and the more floury or fine the powder, the greater the amount of dust in the air of the shop. In addition, they suspect that a volatile product is given off under certain conditions of temperature and moisture.

According to the evidence of some workers, the effects of the powder are more felt on night work; and this may be explained by the fact that ventilation, as a rule, is less free at night, owing partly to the air being too cold to allow of opening the windows freely, and partly to war conditions which necessitate darkening factory windows at night.

The report is a very valuable one, and is the result of a thorough and painstaking inquiry, while their simple and effective suggestions as to prophylaxis should, if adopted, confer an increased immunity on the workers from the toxic attacks of the powder. The injunctions laid down as to the importance of good and plentiful feeding, of personal cleanliness, of rest, of reduced night working, of protecting the person by overalls, and so forth, are sensible and sound. It is so often the case that it is the neglect, on the part of the worker, to follow such simple precautions which leads to a disturbance of health. They are offered authoritative help, but refuse to help themselves; and the observance of such regulations can be made with little personal inconvenience and be still consistent with a maximum output of munitions.

Watford Gas Company.—Out of a revenue profit for the January to June period of this year, £5863, added to the £2494 brought forward, the Directors at the meeting of shareholders to be held on Thursday at Watford will recommend the full statutory dividends of 6⅔ and 5⅞ per cent. per annum on the "A" and "B" capital stocks respectively. There was again a slight decrease in the sale of gas, due to the reduction in lighting; but the demand for gas cookers and fires is increasing. The prices realized for residuals were reported to be "excellent throughout the half year."

WASTE OF COAL.

Danger that Threatens our National Economic Existence.

Among the latest writers on this subject is Dr. Mollwo Perkins, F.I.C., a Member of the Society of Petroleum Technologists. He contributed an article to last Wednesday's "Pall Mall Gazette," a few extracts from which may be given.

After dealing with the domestic side of the problem, he writes: I am convinced that coal must be treated in such a manner as to preserve the volatile hydrocarbons in the form of spirits, oils, lubricants, and tar acids, and to recover the nitrogen in the form of ammonia. I am here referring to the coal which is not required for gas making. Coal treated by low-temperature carbonization will yield all these, and a resultant coke or fuel of remarkable character. Not being subjected to a higher temperature than 500° C., a certain quantity of the volatile matter is allowed to remain in the coke; and this gives it its distinctive character, in that it burns with a smokeless flame. In at least one retort coal-slack can be employed and gives a splendid fuel—the small particles of the coal fusing together to form a coherent smokeless fuel. My investigations have proved that from ordinary bituminous coal or slack or cannels one can obtain approximately:

Spirits, 3 to 7 gallons per ton of coal.
Light oils, 5 to 12 gallons per ton of coal.
Heavy oils, 6 to 28 gallons per ton of coal.

Depending, of course, on the composition of the coal.

The spirits resemble in character and efficiency ordinary motor spirit. The light oils have a specific gravity of about ·900, and a flash-point of about 138° Fahr. The heavy oils have a specific gravity of about ·960, and a flash-point of 118° to 178° Fahr.—the latter agreeing with the Admiralty specification for fuel oils for war vessels. The crude oils contain about 5 per cent. of good paraffin wax, and about 14 per cent. of phenolic bodies (tar acids), which are very valuable as disinfectants. Generally speaking, these low-temperature oils consist of paraffins and olefines and will "crack" further into spirit. Some of them give considerable quantities of benzol and toluol.

The disposal of the resultant coke or fuel is an important matter. Some portion might be used as a smokeless fuel; but I think that the bulk of it should be "gasified" in a producer and converted into electricity—being used in gas-engines.

It is reasonable to assume that the recovery of the oils, and a portion of the ammonia, should pay for the cost of the original coal, together with the expenses of carbonization—leaving the coke at a very low price for conversion into fuel (power) gas. The nitrogen in the coke when burnt in a producer will be recovered as ammonia.

The recovery of this ammonia should cover all expenses of gasification of the coke, with the result that there could be delivered to the engines (either gas or steam) such cheap fuel as would enable current to be developed at a mere nominal cost.

In conclusion, I am convinced that to conserve our coal all the volatile valuable matters should be extracted, and the resultant carbon converted into gaseous power and so into electricity. By these means practically every element in the coal, excepting the ash, is conserved and utilized. But the whole question is of such vital importance that it should not be left to the unaided enterprise of individuals. It must be approached from a national standpoint.

NOTES FROM SCOTLAND.

Perth Gas Matters—At a meeting of the Perth Gas Committee last week, presided over by ex-Bailie Wright, it was stated that the year had been finished with a debit balance of £200. The wages bill had gone up 17 per cent., while the price of coal was considerably higher. There would be additional taxes next year to the amount of £900. Against this, an increase was expected in receipts from the residuals. The price of gas was fixed at 3s. 6d. per 1000 cubic feet—the same as last year.

Reduction at Forfar.—The price of gas in Forfar has been reduced by 2d. per 1000 cubic feet. The estimates were under consideration by the Town Council last Wednesday, and ex-Bailie Lamb, the Convener of the Gas Committee, pointed out that they provided for a small deficit at the end of the year. All the figures, however, were more problematical this year by reason of the uncertainty as to Government action. There was also the question of the price of coal, which might possibly advance 1s. or 1s. 6d. The idea was to work the department with as small a margin as possible either way, in order to avoid payment of the excess profits tax. For the past year they were charged £385 in this respect. Provost Moffat, who seconded, said the department professed to estimate for a surplus to avoid a bank overdraft; but it would be more economical to pay a little bank interest than a large sum in excess profits tax. The sum of £385 charged in respect of last year had not yet been paid; and the Clerk had been instructed to take up the matter with the income-tax authorities with the view of getting it reduced. The estimates were adopted—the price of gas being fixed at 3s. 1d. per 1000 cubic feet, and for motive power 3d. less.

Reduction at Arbroath.—A favourable budget was presented to the Arbroath Town Council last week by Treasurer Duncan. He remarked, in the course of his speech, that the gas-works had had a very satisfactory year, although one of anxiety. The revenue from all sources amounted to £23,253—an increase of practically £4000. The year started with a credit balance of £1670, and ended with a sum in hand of £2261—showing a profit on the year's work of roughly £600. The results had proved so satisfactory that the Gas Committee had reduced the price of gas by 2½d. per 1000 cubic feet.

Largs and its Gas Supply.—At the last monthly meeting of the Largs Town Council, according to the "Glasgow Herald," Bailie Harper and Mr. Taylor had an animated discussion about the management of the gas-works. The Bailie called upon Mr. Taylor to withdraw a statement he made a month previously, to the effect that during the last twelve months the wages bill at the works had risen £80, and that the old Gas Company produced 17 million cubic feet of gas annually with two men, while under municipal management it took four men and a manager to produce 21 millions. Bailie Harper characterized these statements as untrue. Mr. Taylor said he had got the information about the old Gas Company from "eminent members of the town;" but it might be untrue, and he therefore withdrew it. He, however, declined to withdraw any of the other statements he had made. He proceeded to argue that "if it was properly wrought the gas-works could lessen the consumpt, lower the rate, and provide better gas." He was asked to table a motion to allow the whole matter of the gas-works management to be discussed at a future time; but he declined to do so—saying he did not want to be considered as making personal criticism of the Gas Manager or the Gas Committee of the Council.

Increase in Price of Rothesay Gas.—The Rothesay Town Council yesterday week agreed to raise the price of gas by 10d. per 1000 cubic feet—making it 4s. 9½d. per 1000, with the usual 10 per cent. discount on accounts paid within a month of rendering. Slot meters are to be set to 16 cubic feet for 1d., with a discount of 10 per cent.

The Recent Suffocation Case at Maryhill.—An inquiry into the deaths of the three men who were suffocated in a gasholder at the works of the Cassel Cyanide Company, Limited, at Maryhill, on July 21 was held on the 11th inst., in the Justiciary Buildings, Glasgow, before Sheriff Scott Moncrieff and a Jury. The men (Andrew Seath and Robert Seath, father and son, and George M'Lean) had been engaged cleaning the gas-tank, and it was supposed they had been overcome by the fumes. After hearing evidence, the Jury, on the recommendation of the Sheriff, returned a verdict to the effect that the men met their deaths by gas poisoning, and that there was no evidence as to the circumstances in which the three men entered the gasholder at the same time.

Death of a Water-Works Official.—The death has taken place at Ardrossan of Mr. Thomas Anderson, who occupied the position of Burgh Water Manager for the last 24 years. When the water managership was first made a separate office in 1892, Mr. Anderson was appointed from Dumbarton. He was 64 years of age, and leaves a widow and family

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 21.

There is little alteration to report in the market for tar products. Pitch remains at 20s. net per ton for export; while creosote is easier than recently, although no transactions at lower prices have been reported. Solvent naphtha is in strong demand—2s. 3d. net in bulk *ex* makers' works having been paid, and a higher price is now asked.

Sulphate of ammonia remains firm at the last quotation.

Tar Products in the Provinces.

Aug. 21.

There is nothing fresh to report concerning the markets for tar products. Pitch and creosote still remain very quiet. There is a fair demand for solvent naphtha; but the request for heavy is not very good.

The average values of gas-works products during the past week were: Gas-works coal tar, 15s. 6d. to 19s. 6d. Pitch, East Coast, 16s. to 16s. 6d. per ton; West Coast, 15s. to 15s. 6d. Manchester; 16s. to 16s. 6d. Liverpool; 17s. to 18s. Clyde. Benzol, 90 per cent., North, 10½d. to 11½d.; 50-90 per cent. naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2d. to 2¼d. Heavy oils, in bulk, 3⅝d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2½d. per unit; "B" quality, nominally ⅜d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Aug.* 19.

Throughout the week the market for this article has been rather inactive so far as export orders are concerned; but it is reported that a considerable amount of business has been done for home consumption on the special terms recently arranged by the Association. The closing quotations for prompt delivery are £17 10s. per ton f.o.b. Hull, £17 16s. 3d. f.o.b. Liverpool, and £17 17s. 6d. f.o.b. Leith. In the forward position, producers maintain a firm attitude, and it is reported that sales have been made this week at £18 2s. 6d. per ton f.o.b. Liverpool for September-December delivery.

Nitrate of Soda.

This market is quiet but steady, and holders on spot still require 17s. 6d. per cwt. for ordinary, and 18s. for refined quality.

Sulphate of Ammonia.

From another source, it is stated that to-day's prices of this article are as follows: Outside London makes, £16 15s. to £16 17s. 6d.; Hull, £17 10s. to £17 12s. 6d.; Leith, £17 15s.; Liverpool, £17 15s.; Middlesbrough, £17 12s. 6d.

In Plumber Street, Nottingham, considerable damage was done on Saturday afternoon by a gas explosion at a tailoring establishment. Occurring when the busy street was congested with traffic, the incident caused a good deal of excitement. The origin of the mischief was a large gas-ring in the centre of the shop; the explosion following upon an attempt by an assistant to light it.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is irregular; the prices of steam coals being easier for the rest of the month, with fairly steady values forward. The shipments are fair, especially to some of the French ports, and there is a steady output, which is well taken up generally. While the best steam collieries quote from 44s. to 50s. per ton f.o.b., there are some holders who will take lower prices for loading in the rest of this month. Second-class steams are about 36s. per ton; and the steam smalls are without much alteration at 25s. to 28s. per ton. In some cases buyers hold off for lower prices; but as both licences to export and ready vessels are needed to take advantage of the lower figures sometimes named, the business is not very readily carried through. In the gas coal trade, the demand is still increasing slowly, both on home and foreign account. Though there is a little weakness in prices, it is not so much seen for forward delivery. For best Durham gas coals, about 35s. per ton f.o.b. is now the current quotation; for second-class Durhams, about 33s. to 33s. 6d. per ton; and for "Wear Specials," from 37s. 6d. to 39s. per ton f.o.b. There is little doing in additional contracts; but those that are now running take up much of the output available. Freights of gas coals are still on the basis of 11s. 6d., Tyne to London; and there is a good demand for steamers for the ports of France, at the "scheduled" freights. It is expected that the regulation prices of coal for export, as well as the rates of freight, may be soon extended in area. The coke trade is brisk; and the enlarged production seems to be well taken up both for home consumption and for export Gas coke is quoted from 32s. 6d. to 34s. per ton f.o.b. There is a larger use of gas coke in some of the munition factories of the North.

Taunton Gas Company.—The seventy-first annual meeting of the Taunton Gaslight and Coke Company was held last Tuesday, when the Directors reported that the quantity of gas sent out during the twelve months to June was 124,000,200 cubic feet—an increase of 3,861,700 cubic feet over the previous year. The amount available for dividend was £5599, out of which dividends were recommended at the following rates: 5 per cent. on the preference stock, 8 per cent. on the consolidated "A" stock, and 7 per cent. on the new ordinary stock. These dividends would absorb £3930. Further calls on the Company's staff and workmen had been made by the military authorities in the course of the year; and the Directors had continued to pay, as hitherto, allowances to dependants of men on service. The report was adopted; and it was agreed for the future to pay an interim dividend (not to exceed half the yearly dividend), at such times as the Directors should determine. A hearty vote of thanks was accorded to Mr. A. Edwards (the Secretary and Manager) and his staff for their efforts on behalf of the Company.

Croydon Gas Company.

Next Friday the one-hundred-and-thirty-ninth half-yearly meeting of the Company will be held, when the Directors will report that the sales of gas for the six months to June last exceeded those of the corresponding period of 1915 by 2·72 per cent.; the number of consumers increased in the half year by 388; that of stoves on hire was greater by 1025 cookers and 364 fires, while 128 and 215 respectively had been sold to consumers—representing a total increase in gas-stoves for the half year of 1732. The price of gas was raised by 2d. per 1000 feet in April; and in view of the largely increased prices (principally due to freight) which will have to be paid for coal and oil during the coming year, it has been felt necessary to increase the price by a further 2d. as from July. After providing for all fixed charges, there remains available for division a balance of £36,862; and the Directors recommend that dividends for the half year be declared, on the "A" stock of 14½, "B" and "C" stocks of 11½, "D" stock of 5, and "E" stock of 10 per cent. per annum—all less income-tax. These dividends will absorb the sum of £24,103, leaving a balance of £12,759 to be carried to the next account. Referring to the constitution of the Board, the report says: "The Directors have, with extreme regret, to record the great loss which the Company has sustained through the death on the 17th of May last of their eminent colleague, Sir Corbet Woodall, whose membership of the Board for the past twenty-two years has been of inestimable value to the Company. They have elected as his successor, his son, Mr. Henry Woodall, M.Inst.C.E., J.P., who was associated with his father professionally for many years."

Reduced Profits but Big Dividends at Tunbridge Wells.—Last Wednesday the one-hundred-and-fifth half-yearly meeting of the Tunbridge Wells Gas Company was held, under the chairmanship of Alderman W. H. Delves. After referring to the working of the past six months, Mr. Delves said the prospects for the future were that the cost of coal would be higher; and although the Company had bought their supply for the next six months, the delivery was subject to certain restrictions. The price of gas had been increased to consumers. The dividends accordingly would be slightly lower for the half year, and the reduced profits would mean that the bonus to the men would suffer. The Directors hoped that they would be able to present a tolerably favourable balance-sheet at the end of the year; and they would be pleased when the opportunity came to reduce the price of gas to the consumers to 2s. 6d. per 1000 cubic feet. The Chairman mentioned that over seventy employees were serving in H.M. Forces. He finally moved that the following interim dividends be declared: 12½ per cent. per annum on £20,000 of consolidated ordinary stock, 10 per cent. per annum on £30,000 of consolidated "B" stock, and 9½ per cent. per annum on £73 000 of consolidated "C" and "D" stock. After Mr. James Donaldson, of Tonbridge, had congratulated the Directors upon the position of the Company in spite of the many difficulties with which they were faced, the resolution was carried unanimously.

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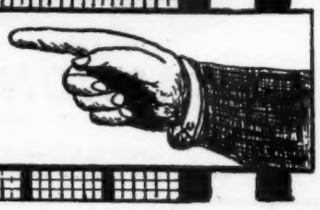


London Office—
165, GRESHAM HOUSE,
OLD BROAD ST., E.C.

Salisbury Gas Light and Coke Company.

The annual meeting of the shareholders in the Company was held last Wednesday. The Chairman, in moving the adoption of the report and accounts, and the payment of the usual dividend on the respective shares issued, said the Directors had passed through a very trying year, owing to the great increase in the cost of coals and materials of every kind, and the shortness of labour. It was a matter of congratulation, therefore, that they were able to recommend the payment of the full dividend. The sales of gas, notwithstanding the lighting restrictions, had been quite satisfactory (5·4 per cent. increase), and residual products, except tar, had sold at better prices. As the sale of crude tar (except when sold for distillation) had been prohibited by the Government, the Directors had at considerable cost erected a dehydrating plant; and the toluol and benzol went direct to the munition factories. The Directors hoped for, and in fact were now getting, a sale for the dehydrated tar, the character and quality of which conform to the requirements of the Road Board. Owing to the increase in the district, they were taking out a very old 9-inch main and laying over a mile of 20-inch main from the works, *viâ* the Canal and Milford Hill; and on its way this will link-up the feeding mains of other parts of the district. This entailed a very large capital expenditure; but efficient supply must have first consideration, and as soon as the Treasury can consent, a fresh issue of capital will be required. In comparison with the volume of business done, the Company were under-capitalized; but this could, as necessity required, be easily amended. In acknowledging the able services of the Engineer, Secretary, and the Auditors, he said that Mr. Fielden (the Engineer and Manager) had been appointed since the last general meeting, and they believed he would fully justify the high credentials he brought with him.

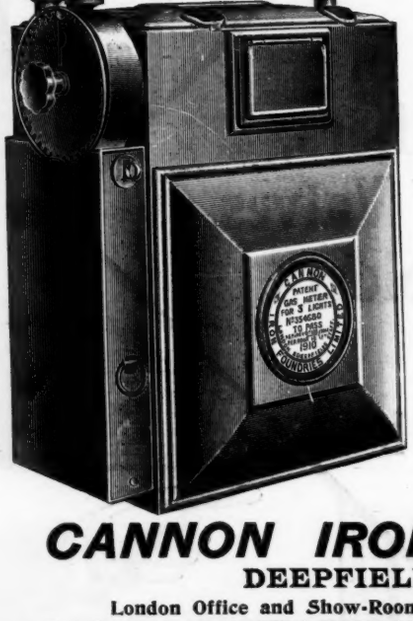
Weymouth Consumers Gas Company.—The half-yearly meeting of the proprietors is being held this week (on Thursday), when the Directors will report that the financial results of the past half year were "very favourable;" the increased receipts more than meeting the advance in expenditure. The quantity of gas sold during the six months (73,058,400 cubic feet) was not quite 3 millions, or 3·9 per cent., less than in the corresponding half of 1915, "when unusual circumstances calling for a larger use of gas prevailed in the town, and when there was no Summer Time Act in force reducing the number of hours during which artificial lighting was required." After debiting the net revenue account with the interest paid on the debenture stock and with the sum of £968 written off the Company's investments, as depreciation, there remains £7207 to the credit of the account, out of which the maximum dividend is recommended at the rate of 5 per cent. per annum on the ordinary stock, less income-tax. The Directors have fortunately been able to enter into contracts for a supply of coal for another year, but at further increased prices. Up to the present time, they say, supplies have reached the works in good quantities.

East Worcestershire Water-Works Company.—The report of the Directors to the half-yearly meeting to be held in Birmingham on Thursday week states that during the half year ended June 30 the additional supplies laid on in the Company's district made the total 8666, exclusive of the services to Droitwich, Studley, and Astwood Bank, which are supplied in bulk. The water pumped at Burcot and Washingstocks averaged 1,275,700 gallons daily. The accounts show a net profit for the six months amounting to £1803—being a further large decrease compared with the returns for recent periods, resulting from increased cost of coal and income-tax. The amount brought forward from the last account, £2362, makes a disposable balance of £4165, which is to be appropriated as follows: To pay a dividend for the half year at the rate of 6 per cent. per annum, less income-tax, £1758; to provide depreciation for machinery and mains, £400; to carry forward the balance, £2007.

Protecting British Capital in Enemy Countries.—There was registered on the 11th inst., an "Association for the Protection of British Capital and Property in Enemy Countries, Limited." It is limited by guarantee, with an unlimited number of members, each liable for £100 in the event of winding-up. The objects of the Association are: To advise and assist members and others by all lawful means (*a*) in protecting and recovering the proceeds of the sale of any business or of shares or interests in any company incorporated or trading in enemy territory, or in protecting and recovering loans made to any company or individual in such territory, and (*b*) in protecting, recovering, realizing, or obtaining compensation for the loss of, or injury to, property, rights, or interests which have been seized, forfeited, destroyed, lost, or injured by, or at the instigation or with the connivance or neglect of, any enemy country. The management of the Association is to be vested in a Council, among the first members of which is Sir Charles J. Jessel, the Chairman of the Imperial Continental Gas Association.

The Hastings Gas Company Fail in an Appeal to the Military Tribunal.—Last Wednesday, at the sitting of the East Sussex Appeal Tribunal, the Hastings and St. Leonards Gas Company appealed for two of their employees—meter inspectors. They were said to be indispensable, and that women could not do the work—they could read the meters, but not inspect them. The men had to have a skilled mechanical knowledge, and to have three years' experience before they were regarded as efficient. There were, in round figures, about 12,500 meters in use at the present time in Hastings. Mr. Glenister, who appeared for the Company, said if the money in the meter did not tally with the amount of gas used they had to diagnose the fault and put it right. Both men were married—one with four children and the other with one. The Company were also engaged in munition manufacture; they had more work than they could cope with at the present time. Out of 188 of their men, 45 had joined the Forces. They formerly had eleven meter inspectors, but they now had only eight, including these two. The appeal was dismissed.

THE "CANNON" Prepayment GAS METERS.



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Difficulties so far Overcome at Chester.—The shareholders in the Chester United Gas Company were informed by the Chairman (Mr. J. M. Frost), at the ninety-sixth ordinary general meeting last Saturday week, that another increase in price would be necessitated if there was any further advance in the price of coal. The Directors' report stated that the Daylight Saving Act had had some effect upon the consumption of gas, but not as serious as might have been anticipated. The increased price had more than counterbalanced the small decrease in the quantity sold; and a substantial increase of revenue from the sale of residuals had been sufficient to meet the increasing difficulty in obtaining raw materials, and would provide the balance required for the usual half-year's dividend. The balance to the credit of the profit and loss account, after providing for the interest upon the debenture stock and dividend on the preference stock to June 30, was £4261; and the Directors recommended the payment of an interim dividend on the ordinary stock for last half year of 2½ per cent. The Chairman, in moving the adoption of the accounts, said the quantity of gas sold was 3,750,000 cubic feet less than last year—a decrease of 2½ per cent. This was not, however, solely due to the effect of the Daylight Saving Act, as more than one-half of the decrease occurred before the Act came into force. The report was adopted; and the dividend as recommended was declared.

Growing Dye Industry in the United States.—Referring to the paragraph under this heading which appeared on p. 295 of last week's issue, we have received from the firm of James Livingston, Limited, copies of two letters they had from the President of the J. P. Devine Company, of Buffalo, U.S.A., which firm they represent in England. The first letter was written early in 1915, and mentioned the serious position in America caused by the outbreak of war, as the United States was practically dependent on Germany for all its dyestuffs and the various coal derivatives. The Devine Company, however, laid out special works for the manufacture of complete chemical plant for coal-tar derivatives and the higher intermediates and dyestuffs, which would likely keep them busy for many months. The second letter—written in June of this year—included a supplementary list of additional plants (seventy in all) supplied by the firm during the past twelve months for coal-tar derivatives. Mr. Devine adds that the aniline trade in America has made wonderful strides during the past two years—the firm having built and installed a large number of plants especially for the trade, under the Direction of a Chemical Director, "whose main work is to study the mechanical construction of the plants, and see from actual experience in operation what improvements (if any) can be introduced to simplify the working, economize the cost of running the plant, and produce a finer finished product."

STOCK MARKET REPORT.

FOLLOWING upon the abolition of minimum prices, the London Stock Exchange last week took a notable step in advance towards the ultimate resumption of "business as usual" by quoting the prices of as many securities as possible in the Official List—a great convenience to the millions who are interested. The present prices will be found in the last column but one of our table.

Business on the Stock Exchange last week, though naturally very quiet on the whole, had a few fitful bursts of animation, apparently engendered by all the favourable factors of the period. These were mainly the uniform progress of our arms and of our Allies' (most temperately described in despatches) abroad and at home, the gratifying Bank returns, and the increase in the stock of gold. Home Government issues were mostly firm, and the War Loan made some advance; but Friday's figures were not the best of the week. The New South Wales 5½ per cent. issue was not a success. Home Rails began well, but drooped away into inanition at the fear of labour trouble. Americans were stronger; but Canadians were kept down by reports of rust in the grain. Argentines and South Africans were among the best. In the Foreign Market, the French Loan was in demand, and Japanese issues rose further. In the Miscellaneous Market, things moved irregularly. Oils and rubber had ups and downs, and ships encountered varying tides of favour and disfavour. Perhaps textiles and other industrials were the steadiest. Business in the Gas Market continued, and is likely to continue, on quite a holiday scale. But if transactions were few in number, they were sufficient to afford an undeniable indication of a generally firm and improving tendency. In almost all lines, the figures show an advance upon those of the week before. In this connection, it must be borne in mind that Gas Light, South Metropolitan, and Tottenham are now quoted *ex div.*, and the amount of the dividend must be allowed for while instituting a comparison. The Treasury have put forth an important new scheme of borrowing securities to be applied as cover for foreign loans. It is mostly regarded as being very fair—indeed, favourable—to the holders, though one or two variations are suggested.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 80, 80¼, Malta and Mediterranean 4⅜, Oriental 108½, 109, Primitiva 42s. 6d., 43s. 1½d., 45s., ditto preference 68s. 1½d., Wandsworth "B" 103, 103½. On Tuesday, British 35⅛, 35⅜, Gas Light ordinary 80¼, 80½, 81, Primitiva 42s. 6d. On Wednesday, Gas Light ordinary 78½, 79½ *ex div.*, ditto preference 73⅝ *ex div.*, ditto debenture 60¾, Primitiva 41s. 3d., 42s. 6d., ditto preference 70s., South Metropolitan 83¾ *ex div.*, Tottenham "A" 121½ *ex div.*, ditto "B" 90¼ *ex div.* On Thursday, Gas Light ordinary 79½, ditto preference 74½, ditto debenture 60½, Liverpool 90½, Primitiva 42s. 6d., ditto preference 68s., South Metropolitan 83¾. 84. On Friday, Gas Light ordinary 79⅜. ditto preference 74, 74½, Imperial Continental 90, Primitiva 42s. 6d., 43s. 1½d., South Metropolitan 83½, 83¾, 84½.

The Bank rate is 6 per cent.—as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4	Aldershot 4 p.c. Pref.	..	65—70*	..
1,551,868	"	April 8	2½	5½	Alliance & Dublin Ord.	59—64	64—66	..
374,000	"	July 10	4	4	Do. 4 p.c. Deb.	76—79	60—65	..
280,000	5	April 29	7½	8/-	Bombay, Ltd.	5⅞—6⅜	5—5½	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water — 10 p.c.	28—30	..	..
333,110	10	"	7	7/-	Bournemouth Gas and Water — B 7 p.c.	15—15½	11⅜—11⅝	..
115,000	10	"	6	6/-	Bournemouth Gas and Water — Pref. 6 p.c.	13½—14	9⅜—10⅛	..
159,740	—	—	—	4	Bournemouth Gas and Water — 4 p.c. Deb.	..	55—58	..
992,045	Stk.	Feb. 26	†14	56/-	Brentford A Consold.	261—266	86—88	..
734,920	"	"	†11	55/-	Do. B New	204—209	83—85	..
55,000	"	"	5	5	Do. 5 p.c. Pref.	109—111	85—90	..
221,400	"	June 11	4	4	Do. 4 p.c. Deb.	91—98	..	..
217,880	Stk.	Feb. 26	11	10½	Brighton & Hove Orig.	208—218	170—173	..
244,300	"	"	8	7½	Do. A Ord. Stk.	154—159	125—127	..
630,000	20	Mar. 26	12½	22/6	British	44—45	34½—35½	35½—35⅝
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	..	..
245,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	60—65	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	1¼—1¾	..
100,000	10	—	—	4/6	Do. 4½ p.c. Pref.	4—6	4⅜—5	..
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—76	60—65	..
157,150	Stk.	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	..	..
1,518,380	Stk.	Feb. 12	5.9/4	49/4	Commercial 4 p.c. Stk.	106—108	74—76	..
560,000	"	"	5½	46/8	Do. 3½ p.c. do.	103—105	70—72	..
475,000	"	June 11	8	8	Do. 3 p.c. Deb. Stk.	69½—71½	55—57	..
900 000	Stk	"	4	—	Continental Union, Ltd.	76—79	36—38	..
300 000	"	"	7	—	Do. 7 p.c. Pref.	115—118	..	..
278,400	—	—	—	11½	Croydon B and C 7 p.c.	..	180—190	..
—	—	—	—	—	Do. E	..	..	..
492,270	Stk.	—	6	5½	Derby Con. Stk.	128—135	..	..
55,000		—	4	4	Do. Deb. Stk.	102—104	..	..
1,002,180	10	July 29	10	10/-	European, Ltd.	17⅛—18	12½—13½	..
16,315,430	Stk	Feb. 10	4/17/4	42/-	Gas Light and Coke — 4 p.c. Ord.	98—102	78⅝—79½*	78½—81*
2,600,000		"	3½	3½	Gas Light and Coke — 3½ p.c. max.	76—79	59—61*	..
4,062,235		"	4	4	Gas Light and Coke — 4 p.c. Con. Pref.	96—99	73—75*	73⅜—74½*
4,674,850		June 11	3	3	Gas Light and Coke — 3 p.c. Con. Deb.	72½—74½	59—61	60½—60¾
130,000	"	"	10	10	Do. 10 p.c. Bonds	..	..	..
258,740	Stk	Mar. 12	5	4½	Hastings & St. L. 5½ p.c.	87—89	80—85	..
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16⅛—16⅜	8—9	..
86,600	—	—	—	9½	Hornsey 7 p.c.	..	130—140	..
131,000	Stk.	Mar. 12	7½	7½	Ilford A and C	151—154	115—120	..
65,780	"	"	6⅜	5¾	Do. B	115—119	105—110	..
65,500	"	June 26	4	4	Do. 4 p.c. Deb.	92—94	73—76	..
4,940,000	Stk	May 14	9	4½	Imperial Continental	150—160	90—95	90
1,335,000	Stk	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	65—67*	..
235,342	Stk	Mar. 12	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	90—95	..
2,498,905	Stk	Feb. 26	10	5	Liverpool 5 p.c. Ord. — A	211—213	89½—90½	90½
					Liverpool 5 p.c. Ord. — B	146—148		
306,083	"	June 26	4	4	Do. 4 p.c. Pr. Deb. Stk.	..	88½—89½	..
75,000	6	June 11	6	2/-	Malta & Mediterranean	4⅜—4⅝	4—4¼	4⅜
250,000	Cl	April 1	4½	4½	Met. of Melbourne 4½ p.c. Deb.	99—101	90—98	..
541,920	2	May 28	4	6/-	Monte Video, Ltd.	11½—12	8⅜—9½	..
1,975,892	Stk	July 29	4½	4½	Newc'tle & G'tesh'd Con.	98½—99½	81½—82½	..
529,705	Stk	June 26	3½	3½	Do. 3½ p.c. Deb.	82—83	75—77	..
55,940	1	Feb. 26	7/14/0	7/8⅝	North Middlesex 7 p.c.	14—15	11—12	..
300,000	Stk.	May 14	8	8	Oriental, Ltd.	117—122	108—110	108½—109
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	..
60,000	50	Feb. 26	13	65/-	Portsea, Island B	128—131	95—100	..
100,000	50	"	12	60/-	Do. C	118—121	95—100	..
52,000	50	"	10	—	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	2—2½	2⅛—2⅜
499,960	5	June 26	5	2/6	" 5 p.c. Pref.	4½—5	3⅜—3⅝	68/—70/-
521,600	100	June 2	4	4	" 4 p.c. Deb.	91—93	80—82	..
—	—	—	—	4	" " " 1911	..	..	..
346,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	60—65	..
150,000	10	May 14	6	6/-	San Paulo — 6 p.c. Pref.	10½—11	8½—8⅝	..
125,000	50	July 1	5	5	San Paulo — 5 p.c. Deb.	47—49	43—45	..
135,000	Stk.	Mar. 12	10	10	Sheffield A	223—224	186—190	..
209,984	"	"	10	10	Do. B	222—224	186—190	..
523,500	"	"	10	10	Do. C	220—222	186—190	..
90,000	1	May 28	9	6/-	South African	10½—11½	..	..
6,609,895	Stk	Feb. 10	6/4/0	44/-	South Met., 4 p.c. Ord.	111—113	83—85*	83½—84½*
1,895,445	"	July 10	3	3	Do. 3 p.c. Deb.	72½—74½	59—61	..
224,820	Stk	Feb. 26	8½	8	South Shields Con. Stk.	157—159	153—155	..
952,795	Stk	Feb. 26	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	80—82*	..
60,000	"	"	5	5	Do. 5 p.c. Pref.	110—112	79—81*	..
135,000	—	—	—	48/4	Do. West Kent.	..	..	..
187 556		June 26	5	5	Do. 5 p.c. Deb. Stk.	116—118	90—92	..
647,740	Stk	May 14	5	5	Southampton Ord.	99—102	90—95	..
120,000	Stk.	Feb. 12	7½	7½	Tottenham — A 5 p.c.	135—138	118—123*	121½*
782,275	"	"	6	6	Tottenham — B 3½ p.c.	115—117	89—91*	90½*
181,255	"	June 26	4	4	Tottenham District — 4 p.c. Deb.	87—89	73—75	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	93—95	60—65	..
286,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	108½—109½	93½—94½	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8⅜	73/9	Wandsworth A 5 p.c.	151—156	117—122*	..
255,586	"	"	6⅝	63/9	" B 3½ p.c.	129—134	101—103*	103—103½*
108,075	"	"	5/17/8	55/1⅜	" C 3½ p.c.	110—115	88—93*	..
852,000	"	"	6⅛	57/6	Wimbledon 5 p.c.	117—122	93—98*	..
98,000	"	"	6⅝	63/9	Epsom 5 p.c.	121—126	98—103*	..
88,416	"	June 26	8	8	Do. 5 p.c. Deb. Stk.	66—70	53—56	..

* Ex. Div. † Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

South Hants Water-Works Company.—At the offices in Southampton, the shareholders of this Company met, on the 9th inst., under the presidency of Captain A. J. Corse Scott, J.P. The report stated that the profit and loss account at June 30 showed a credit balance of £12,861, and the Directors proposed to pay an interim dividend at the maximum rate on each class of ordinary shares for the six months. The Engineer and Manager (Mr. D. Kitchingman, M.Inst.C.E.) reported that the works of the Company were maintained in an efficient state. The Chairman informed the shareholders that the revenue of the Company from water and meter rentals showed the very satisfactory increase of about £2300 over the corresponding six months of last year, whereas the working expenses showed an increase of about £1000. Mr. A. W. Oke, B.A., seconding the motion, mentioned the late very satisfactory sale of stock by tender, especially at these war times; and after a short discussion the proposal was unanimously adopted.

West Surrey Water Company.—A meeting of the shareholders of this Company was held last Tuesday at 38, Parliament Street, S.W.—Mr. A. Telford Simpson presiding. Maximum dividends at the rate of 7 per cent. per annum were declared upon the ordinary £10 shares issued under the Acts of 1877, 1888, and 1901; and a maximum dividend of 10 per cent. per annum on the ordinary £10 shares issued under the Company's Act of 1869. The income for the half year, after making provision for empty houses, irrecoverable rates, &c., amounted to £9719, and the expenditure to £4471. Comparing the accounts with the corresponding half year of 1915, the income exhibited an increase of £266, and the expenditure an increase of £443. The excess expenditure was "heavier than formerly, principally through the high cost of fuel, wages, &c." The Engineer and Manager (Mr. John K. Hill) reported that the whole of the Company's engines, boilers, buildings, filter-beds, high-service and storage reservoirs, mains, and works were in good working condition. After paying the dividends recommended there will be a balance to carry forward of £2780.

Southend Gas Company.—The report for the half year to June 30 states that the quantity of gas sold during the six months was 182,171,900 cubic feet—a decrease of 11·81 per cent. In consequence of the considerably increased cost of coal, oil, &c., despite vigilant attention to working costs, the Directors were reluctantly compelled to increase the selling price of gas from the Lady-day quarter to 3s. 8d. per 1000 cubic feet; and "so long as high prices rule at the pits' mouths, with unprecedented freightage rates, and a decreased output of gas, a reduction of the present charges must be postponed." The accounts, after transferring £120 from the reserve fund, show an available balance of £6605; and dividends are recommended at rates of 5 per cent. per annum on both the original and new ordinary stocks and 4½ per cent. on the new ordinary stock less income-tax. The shareholders' meeting is being held to-day (Tuesday) at Southend.

It was mentioned at the recent meeting of the Maidstone Gas Company that the Directors had, for the first time, arranged to purchase a quantity of Kent coal from the Tilmanstone Colliery.

The Tadcaster Tribunal have granted final postponement for two months to Mr. E. Garsed, the Secretary and Manager of the Kippax Gas-Works, who is also Secretary to the Sherburn and Milford Gas-Works.

A Limited Liability Company has been formed to take over the business of Messrs. E. Catchpole and Sons, tar distillers, of Plough Bridge, Rotherhithe. The capital of the new concern, which was registered on the 14th inst., is £40,000, in £1 shares.

The Bingley District Council have referred to arbitration the question of a war bonus for gas employees. The Huddersfield Corporation have decided not to entertain an application from the mainlayers, service-men, and labourers in the Gas Department for a war bonus.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ASSISTANT (CHEMIST AND DRAUGHTSMAN). Ramsgate Gas and Water Department. Applications by Aug. 31.
BOOK-KEEPER COLLECTOR. Elsecar Gas-Works. Applications by Aug. 25.
WORKING GAS MANAGER. Mr. Charles Comins, 50, Cannon Street, London, E.C.
SALESMAN (MANTLES). No. 6212.
CLERK (GAS AND WATER COMPANY). No. 6213.

Appointments, &c., Wanted.

ENGINEER, MANAGER, SECRETARY, OR MANAGING-DIRECTOR. No. 6214.
FOREMAN (TAR DISTILLATE, &c., PLANT) J. Ashworth, Darlington.

Gas-Works for Sale.

HALESWORTH GAS COMPANY. Tenders by Aug. 31.

Patent Licence or Sale.

GAS MANTLE MANUFACTURE. D. Young and Co., Southampton Buildings, Chancery Lane.

Plant, &c. (Second Hand), for Sale.

EXHAUSTERS AND ENGINES. North Bitchburn Coal Company.
GAS ANALYSIS APPARATUS. Yorkshire Electric Power Company.
GAS EXHAUSTER AND ENGINE. Leek Lighting Committee.
PIPES. Ocean Coal Company, Rhondda.

Plant, &c. (Second Hand), Wanted.

AMMONIA STILL. Brotherton and Co., Leeds.

Electrical Engineering Courses.

E. A. MANSFIELD AND CO., New Brighton.

Meeting.

HARROW AND STANMORE GAS COMPANY. Westminster Palace Hotel. Sept. 5. One o'clock.

TENDERS FOR

Carbon. No. 6192.

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